Final – Adopted July 20, 2021

City of Yuba City
2020 Urban Water Management Plan

Prepared by:

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Comprehensive Water Planning

Table of Contents

List of Tables

List of Figures

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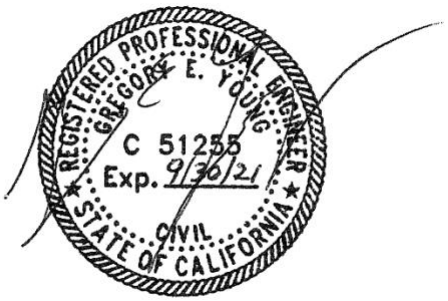
This 2020 Urban Water Management Plan was prepared under the direction of a California licensed civil engineer.



Executive Summary
Layperson's Description

After the devastating drought in the late 1970s, the California Legislature declared California's water supplies a limited resource, subject to ever-increasing demands and that the long-term, reliable supply of water is essential to protect California's businesses, communities, agricultural production, and environment. To strengthen local and regional water management and drought planning, the Urban Water Management Planning Act (UWMPA) was signed into law in 1983.[1] Since then, the Legislature has amended the UWMPA to require additional detail in UWMPs, including addressing resilience to drought and climate change.

The UWMPA requires urban water suppliers serving over 3,000 customers or supplying at least 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) every five years,[2] and demonstrate water supply reliability in a normal year, single dry year, and droughts lasting at least five years over a twenty-year planning horizon.[3] The UWMPA also requires each urban water supplier to prepare a drought risk assessment and water shortage contingency plan.[4]

At a practical level, the UWMP provides the water management planning foundation for urban water suppliers throughout California. A well-constructed UWMP will provide the supplier's elected officials, management, staff, and customers with an understanding of the agency's past and current, as well as projected future, water supply and demand conditions. The UWMP integrates local and regional land use planning, regional water supply, infrastructure, and demand management projects, and also identifies challenges that may result from climate change and evolving regulations. Thoughtful urban water management planning provides an opportunity for the supplier to evaluate supplies and demands using a balanced and methodical planning platform that addresses short-term and long-term planning conditions. In brief, the UWMP gathers, characterizes, and synthesizes water supply related information from numerous sources to inform the agency's planning, while also providing interested local, regional, and statewide stakeholders with access to the same information.

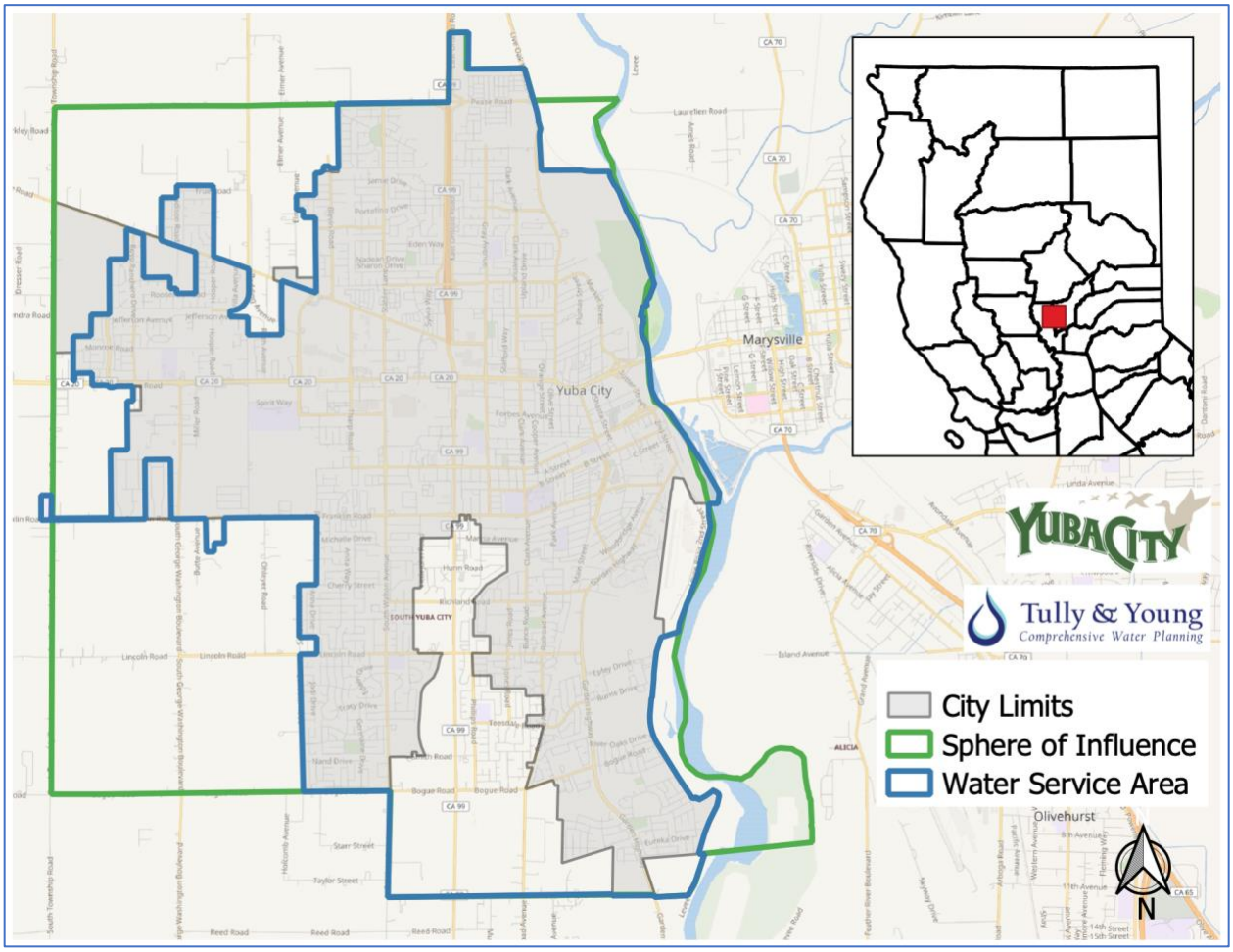
[1] California Water Code Section 10610 *et seq*. (Chapter 1 added by Stats. 1983, Ch. 1009, Sec. 1).
[2] California Water Code Section 10610 *et seq*.
[3] California Water Code Sections 10631-10635
[4] California Water Code Sections 10632

ES-1 City of Yuba City

Yuba City is the agricultural, economic and social hub of Sutter County, situated on the west bank of the Feather River in the northern part of California's fertile Central Valley. Surrounded by agricultural land, it is a family-oriented residential community which maintains a small-town feel. The City provides both water and wastewater services to its community.

The water service area is about 14.9 square miles and generally contiguous with City boundaries, but it does extend service to some customers located outside the city limit and in the City's Sphere of Influence (SOI). The map in Figure ES-1 shows the water service area. The City provides water service to approximately 18,800 residential, commercial, irrigation, industrial and institutional/governmental service connections. Much of the development is low-density, single-family housing and retail related commercial use. Notable large industrial water customers are Yuba City Energy Center, Greenleaf Unit 2 & Associates, Sunsweet, and Valley Fine Foods.

Figure ES-1: Water Service Area



Prior to completing a surface water treatment plant in the late 1960's, the City's water supply was derived from groundwater. Currently, the City relies primarily on surface water obtained through an array of water rights and contracts, supplementing with a small amount of groundwater periodically. Specifically, the City's water supply portfolio contains the following rights and contracts:

- Licensed and permitted water rights authorized by the State Water Resourced Control Board
- Contract with the State Water Project
- Contract with the North Yuba Water District

With growth projected into the future, the City will see an increased demand for water service, requiring the City to continue to diligently manage its existing supplies and assure that both existing and new future customers will use water efficiently and effectively so as to maintain desired levels of water service reliability.

ES-2 Water Service Reliability

Yuba City's water service reliability hinges on the active management of the City's water supply portfolio to meet its demands. More succinctly, even though the City's total annual water supplies are more than enough to meet the City's annual water demands, the monthly availability of each supply must be actively managed to meet the City's monthly water demands over the course of any given year. In addition, the supplies must be even more astutely managed in order to provide sufficient water supplies to meet the monthly demands during extended dry conditions.

The fundamental management tenet for Yuba City's water service reliability in dry periods is to preserve as much water supply during normal and wet conditions in order to make those water supplies available during dry conditions. The City's water supply contracts with the California Department of Water Resources and North Yuba Water District provide opportunities to reschedule a normal or wet year water supply so that this water supply can be accessed for use in dry months or dry conditions. These carryover and rescheduling provisions allow water to be stored for use in drier months or subsequent years. Each year, the City should try to maximize its contract water supplies in order to recapture those supplies during dry conditions.

A second management principle for the City is to use supplies that would otherwise be lost if they are not used when those supplies are available. For example, in normal and dry year conditions, the City's appropriative water rights – License 13855 and Permit 18558 – vary in their availability depending upon hydrological and regulatory conditions. In normal and wet years, License 13855 is available as many as 10 months of the year but in dry and critically dry years, the right may be curtailed for up to 5 months. Similarly, Permit 18558 is normally available 8 months of the year and in dry and critically dry conditions may be available only 5 months of the year. Accordingly, during the months when these supplies are available, the City should use these water assets because if the rights are not exercised, the water supplies cannot be stored or otherwise preserved for other future uses.

Third, the City should preserve other water supplies in its portfolio that have additional flexibility related to their potential delivery. For instance, in a normal or dry year, the City has access to State Water Project water supplies in all months of the year and potentially to its North Yuba Water District supplies

between 6 months and 12 months in the year. The City should plan to take these water supplies only when other water supplies become unavailable (like the appropriative water rights noted above). Managing the City's water supply portfolio with these three management principles in mind, creates the water service reliability for the City to weather a drought lasting five consecutive years through 2045.

Last, the City should use its groundwater capabilities to help flexibly manage the City's surface water asset portfolio. The groundwater available to the City considered in this UWMP is tied to its historical monthly use based on well-system and other infrastructure constraints. The City may use this supply to help preserve surface water assets for use in dry months and dry years. Moreover, the City may improve the utility of its groundwater resources in order to bolster its management flexibility in the future in the context of the Sustainable Groundwater Management Act. For purposes of this UWMP, the City's available groundwater supplies approximate its highest monthly groundwater use but will likely increase in the future.

Over the long term, the City's water supply portfolio should be adequate to meet its potential long-term growth objectives. The City's long-term water service reliability considerations have three important components in this analysis: (1) an increase in the annual total demand that the City's water supplies will need to satisfy; (2) an increase in the monthly demands that will impact the City's active annual water management; and (3) no planned increase in the City's total water supply available in its water supply portfolio (although there are options, like groundwater augmentation, that are actively being considered). All of these items are considered in the City's water service reliability projections.

The City has a diverse and robust water supply portfolio capable of meeting the water demands in its service area in normal, single dry, and five consecutive dry years from 2020 through 2045 so long as active management of its supply portfolio occurs. The City's diverse water supply portfolio requires coordinated water management between the City and its contract partners – DWR and NYWD – in order to render the City's total supply reliable in all year types through 2045.

In addition to these water service reliability considerations, the City also has updated its Water Shortage Contingency Plan (WSCP) to address any potential water shortage conditions. This updated WSCP allows the City to reduce the water demands on its water system in shortage or catastrophic outage conditions. The measures contemplated in the updated WSCP include typical dry condition water management actions – like mandatory outdoor irrigation during evening, nights, and early mornings – imbedded into six water shortage categories (up to 10%, 11-20%, 21-30%, 30-40%, 40-50% and over 50%). Importantly, in the event there were to be a catastrophic water outage in the City, water demands will be limited to use for health and safety purposes only. Combining the updated WSCP with the City's active water management of its supply portfolio provides additional buffer against unpredictable water conditions.

In summary, Yuba City's diverse surface water supply portfolio, its active management of its water supply portfolio, and its WSCP provide the City with stable and reliable water service to meet the City's current and 2045 projected water demands in normal, single dry, and five consecutive dry year scenarios.

Chapter 1
Introduction

Yuba City is the agricultural, economic and social hub of Sutter County, situated on the west bank of the Feather River in the northern part of California's fertile Central Valley. Surrounded by agricultural land, it is a family-oriented residential community which maintains a small-town feel. Development of the City's open space into thoughtfully planned communities will maintain the goal of a cohesive city feel featuring integrated neighborhoods that have access to parks, schools and commercial facilities. Pairing this community growth with economic development that attracts and maintains quality business and industry are key planning objectives and guiding principles for the City's growth.

Ensuring an adequate supply of water is available to serve the existing and future needs for the City's residents and Commercial, Institutional and Industrial (CII) customers is a critical component of successful city planning. This Urban Water Management Plan (UWMP) draws on local, regional and statewide inputs to synthesize information from numerous sources into a reliable water management action plan designed to be referred to as management decisions arise and conditions change.

1.1 Background and Purpose

The City has prepared this 2020 UWMP to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers.[5] This 2020 UWMP addresses the City's water management planning efforts to assure adequate water supplies to meet forecast demands over the next 25 years. As required by the UWMPA, the City's 2020 UWMP specifically assesses the availability of its supplies to meet forecast water uses during average, single-dry and five consecutive drought years through 2045. Verification that future demands will not exceed supplies and assuring the availability of supplies in dry-year conditions are critical outcomes of this 2020 UWMP.

The 2020 UWMP is an update to the City's 2015 UWMP and presents new data and analysis as required by the California Department of Water Resources (DWR) and the California Water Code (CWC) since 2015. The 2020 UWMP is also a comprehensive water planning document that describes existing and future supply reliability, forecasts future water uses, presents demand management progress, and identifies local and regional cooperative efforts to meet projected water use.

The UWMP is designed to be a valuable water management and planning tool to guide and inform the City's managers, customers and the State of California about its water management practices. It reflects

[5] California Water Code sections 10610 through 10657.

the City's planning assumptions and goals and should be used in combination with other planning resources and documents over the UWMP planning horizon.

The State of California's drought vulnerability and the additional pressures of climate change and population growth have emphasized the importance of planning ahead to meet water demands with potentially at-risk water supplies. Such forward planning is an important outcome of the 2020 UWMP.

1.2 Basis for Plan Preparation

The City operates a Public Water System as described in California Health and Safety Code 116275. The Agency qualifies as a Retail Urban Water Supplier as described in Water Code Section 10617, providing water for municipal purposes to more than 3,000 customers or 3,000 acre/feet of water per year. This qualification requires the preparation of an Urban Water Management plan every five years. The Agency's Public Water System detail is listed in Table 1-1.

Table 1-1: Public Water System Information

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020
CA5110002	City of Yuba City	18,834

The State Legislature passed numerous new requirements since the 2015 UMWP which are detailed throughout this 2020 UWMP[6]. Major updates to the requirements are listed below along with a reference to the corresponding section in which they are addressed in this document.

- **Five Consecutive Dry-Year Water Reliability Assessment:** The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation. This statutory change requires a Supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period. This new requirement is addressed in Chapter 3—Water Supply, Chapter 4–Water Use, and Chapter 5—Water Service Reliability Assessment.

- **Drought Risk Assessment (DRA):** Due to the extensiveness of recent California droughts and the variability associated with climate change predictions, the California Legislature created a DRA requirement for UWMPs. The DRA requires assessment over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability for five consecutive dry years. The DRA is addressed in Chapter 5— Water Service Reliability Assessment and Chapter 6—Water Shortage Contingency Plans.

- **Seismic Risk:** Evaluating seismic risk to water system infrastructure and facilities and having a mitigation plan is now required by the Water Code. Incorporating the water system into

[6] California Water Code Section 10608 to 10608.44; Section 10609 to 10609.38; Section 10610 to 10657

regional or county hazard mitigation planning is an important aspect of this new statue. Seismic risk is addressed in Chapter 6.

- **Water Shortage Contingency Plan:** In 2018, the Legislature modified the UWMPA to require a Water Shortage Contingency Plan (WSCP) with specific elements. The WSCP is a document that provides a Supplier with an action plan for a drought or catastrophic water supply shortage. The WSCP is in Chapter 6 of this UWMP.

- **Groundwater Supplies Coordination:** 2020 UWMPs are required to be consistent with Groundwater Sustainability Plans following the 2014 Legislature enactment of the 2014 Sustainable Groundwater Management Act (SGMA). The reliance on groundwater is described in Chapter 3—Water Supply.

- **Lay Description:** A synopsis of the fundamental determinations of the UWMP is a new statutory requirement in 2020. This section of the 2020 UWMP is intended for new staff, new governing members, customers, and the media, and it can ensure a consistent representation of the UWMP's detailed analysis.

1.3 Coordination and Outreach

As required by the Urban Water Management Planning Act (UWMPA) the City has coordinated with nearby agencies while developing this UWMP in order to ensure consistency with other related planning efforts such as the City General Plan, Water Master Plan (WMP), and Groundwater Sustainability Plan (GSP). This requirement includes coordination with (a) water suppliers that share a common water source, (b) relevant water management agencies that affect the City's water assets, and relevant public agencies that may have land use or other regulatory relationships with the City. The City has prepared this 2020 UWMP in coordination with regional water purveyors and has appropriately notified and coordinated with other appropriate local government agencies as listed in Table 1-2.

As stipulated in Water Code Section 10621(b), every urban water supplier shall conduct a public hearing in order to encourage active involvement from diverse elements of the community. The City sought public participation with a public hearing and appropriate notices as required by law. These coordination efforts and Statutory Requirements for Notice are also included in Table 1-2.

Table 1-2: Public and Agency Coordination

Coordinating Agencies	Sent Copy of Draft UWMP	Sent 60-Day Notice	Notice of Public Hearing
Department of Public Works	X	X	X
Sutter County	X	X	X
North Yuba Water District	X	X	X
Department of Water Resources	X	X	X
General Public	X	X	X

1.4 UWMP Adoption

The City held a public hearing regarding its 2020 UWMP on July 20, 2021. Before the hearing, the City made a draft of the 2020 UWMP available for public inspection at the City's Public Works Department and on the City's website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time in the local press as required under the UWMPA, and posting of the hearing at the City's office.

The City adopted this 2020 UWMP on July 20, 2021. A copy of the adopted 2020 UWMP will be submitted to DWR, provided to the County and the California State Library, and posted onto the City's website.

The City plans to submit all required documentation related to the UWMPA through the DWR submittal website soon after adoption. These include the on-line submittal of information associated with the following DWR Excel workbooks:

- "FINAL Submittal 2020 UWMP Tables 05.10.2021.xls"
- "FINAL SBX7-7 Verification Form 04.02.2021.xls"
- "FINAL Energy Use Tables 04.01.21.xls"

1.5 Document Organization

This UWMP is organized as follows:

- Executive Summary provides an overview of the purpose and findings of this 2020 UWMP.
- Chapter 1 establishes the basis for the UWMP, describes outreach activities and introduces the document organization.
- Chapter 2 provides a description of the System's service area, demographic characteristics and climate, and describes the future population the City anticipates needing to serve.
- Chapter 3 describes the System's current and future water supplies and the availability of the supplies through 2045.
- Chapter 4 details the customer uses, including the past and future estimated uses, and describes the City's past and on-going demand management measures.
- Chapter 5 presents the City's water system service reliability into the future, including an assessment of reliability if a drought occurred over the next five consecutive years.
- Chapter 6 is the City's stand-alone water shortage contingency plan, incorporated as a chapter in this UWMP, but also available to be shared and utilized separate from the UWMP.

NOTE TO DWR:

The City of Yuba City has written this Urban Water Management Plan (UWMP) primarily as a water resources planning tool to effectively manage water supply, reliability and demand. This UWMP also satisfies all the requirements of the Urban Water Management Planning Act (UWMPA).

The body of the document provides narratives, analysis and data that DWR requests in its 2020 UWMP Guidebook, including changes to the California Water Code since 2015. Efforts have also been made to include enhancements to this document wherever possible as recommended in the 2020 UWMP Guidebook.

To facilitate review by DWR for compliance with the UWMPA, data from the body of the document has been transferred into required DWR submittal tables consistent with the organization of the tables in Appendix E of the 2020 UWMP Guidebook. These tables are separately uploaded to DWR's web portal. This UWMP has been reviewed for adequacy according to the UWMP Checklist as contained in Appendix F in the 2020 UWMP Guidebook.

Chapter 2
Water Service and System Description

Yuba City is located in the Sacramento River basin watershed along the west bank of the Feather River in Northern California about 40 miles north of Sacramento. The City has served as the Sutter County seat since 1856 and was incorporated in 1908. The Sutter Buttes lie just to the northwest and the surrounding area is mostly undeveloped agricultural land to the north, west, and south of the City. Its sister city, Marysville, is directly across the river to the east at the confluence of the Yuba and Feather Rivers.

Yuba City is a medium-sized valley community and serves as the urban and economic hub of the Yuba-Sutter region. Most of the economic activity is attributed to agriculture and support businesses, including agricultural processors, retail, medical, and other government and private service providers. Yuba City also serves as a residential base for a commuter population to nearby Sacramento and its economically growing metropolitan region.

Yuba City provides both water and wastewater services to its community. The water service area is about 14.9 square miles and generally contiguous with City boundaries, but it does extend service to some customers located outside the city limit and in the City's Sphere of Influence (SOI). The map in Figure 2-1 shows the water service area in detail. The City provides water service to approximately 18,800 residential, commercial, irrigation, industrial and institutional/governmental service connections. Much of the development is low-density, single-family housing and retail related commercial use. Notable large industrial water customers are Yuba City Energy Center, Greenleaf Unit 2 & Associates, Sunsweet, and Valley Fine Foods. Table 2-1 shows the historical and current breakdown of service connections by customer class.

Yuba City's water supply and wastewater services are managed by the City's Utilities Department, which operates the Water Treatment Plant (YCWTP), Wastewater Treatment Facility, and Laboratory. The municipal water district was created in 1910 and in 1922 a sanitation department was formed and installed a sewer system. Prior to the completion of the YCWTP, water supply came from local groundwater sourced from City-operated wells. The water was "hard" and contained high levels of sulfides, iron, and manganese. In 1965 voters passed a bond measure, with 91% of the vote in favor, to fund a new surface water treatment plant. The YCWTP was placed into service in 1969. Two treatment processes are included: the original conventional filtration treatment process and a newer membrane filtration treatment facility that was installed in 2007.

Following completion of the YCWTP, the primary water source has been surface water diverted from the Feather River. The City's water supply assets are detailed in Chapter 3.

Figure 2-1: Water Service Area

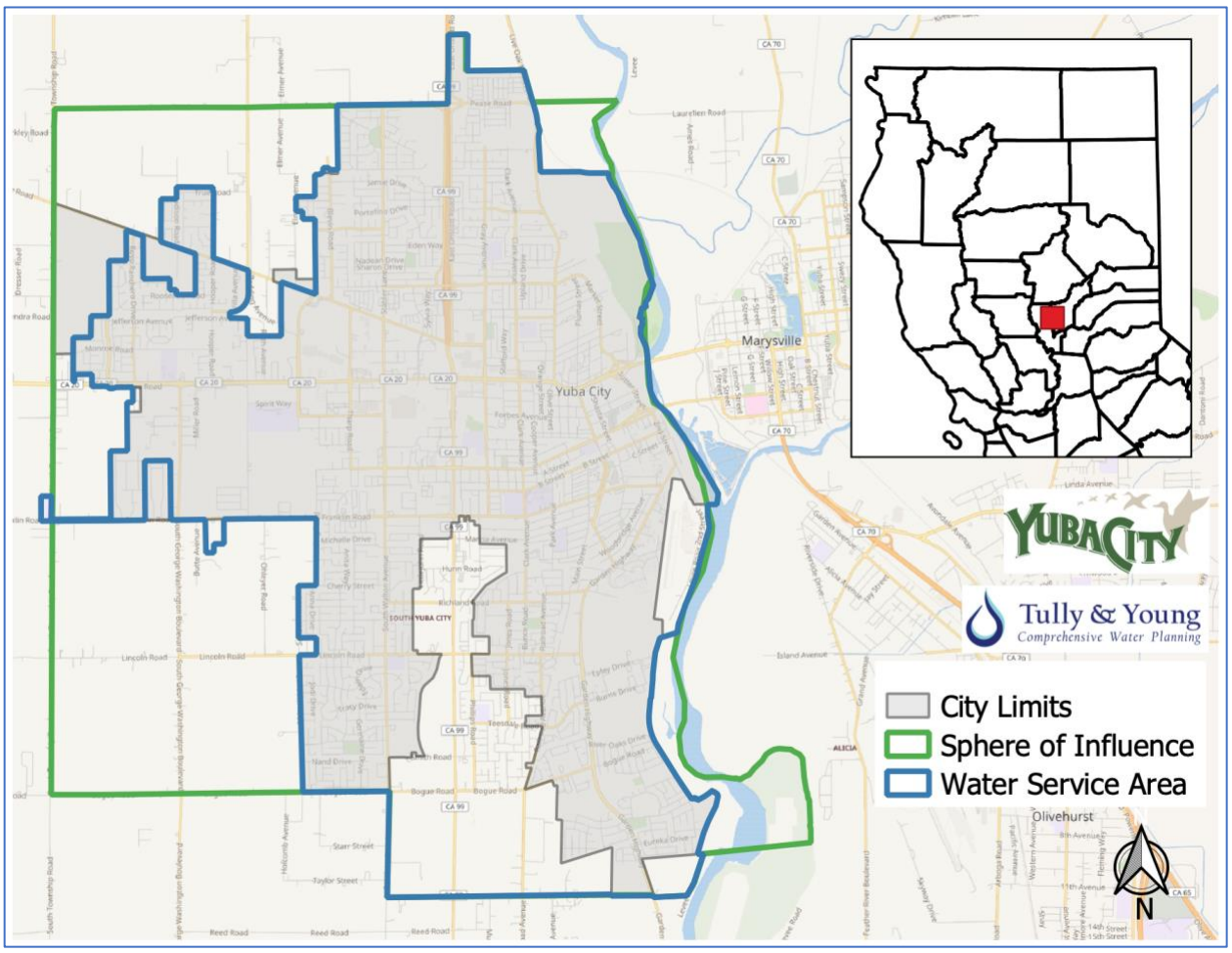


Table 2-1: Customer Water Service Connections

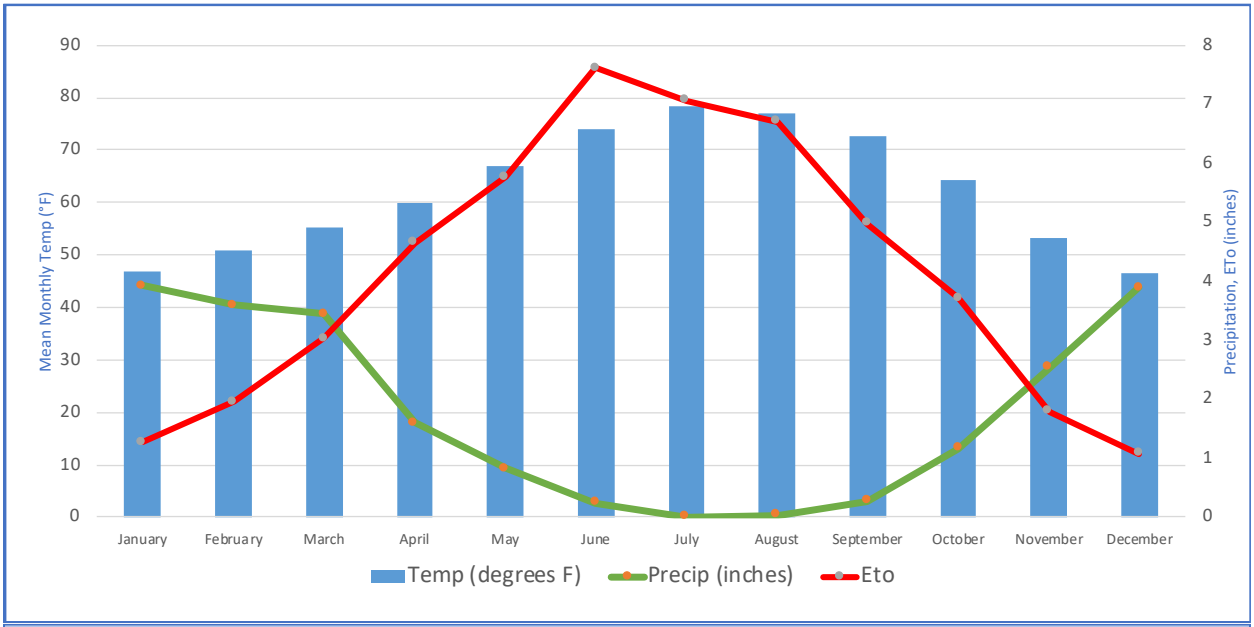
Customer Class	2015	2016	2017	2018	2019	2020
Single Family Residential	15,821	15,880	15,870	16,153	15,967	16,027
Multi-Family Residential	1,154	1,155	1,156	1,176	1,146	1,158
Commercial/Institutional	1,225	1,233	1,226	1,309	1,236	1,235
Industrial	5	5	5	5	7	7
Landscape Irrigation	393	399	354	420	363	380
Other	14	25	29	45	39	27
Total	18,612	18,697	18,640	19,108	18,758	18,834

2.1 Service Area Climate

Typical of the California Central Valley, Yuba City has a Mediterranean climate with hot, dry summers and cool, wet winters. Historical averages show January as the coolest and wettest month, and July as the hottest and driest. The wet season is from October to April with a 30-year annual average rainfall of 21.45 inches. The annual mean temperature is 62 degrees, but the summer months can regularly see average highs in the mid-high 90s, and average winter lows hover down in the 30s and 40s. Other climate characteristics include frequent Tule Fog coinciding with the rainy season which brings dense fog caused by high relative humidity (after rain) and rapid cooling during the night. The fog can get trapped, due to temperature inversions common in the Sacramento valley, for days or even weeks. Snow is rare but cold fronts can bring freezing temperatures with trace amounts of snow and ice. Autumn starts warm and dry and becomes cooler, wetter and foggier later into the season. The last rains in spring are generally in late April or early May.

Figure 2-2 shows the average monthly temperature, rainfall, and evapotranspiration (ETo) for the service area. Actual annual rainfall totals deviate quite significantly from the 30-year average as illustrated in Figure 2-3; in most years, precipitation totals fall below the mean.

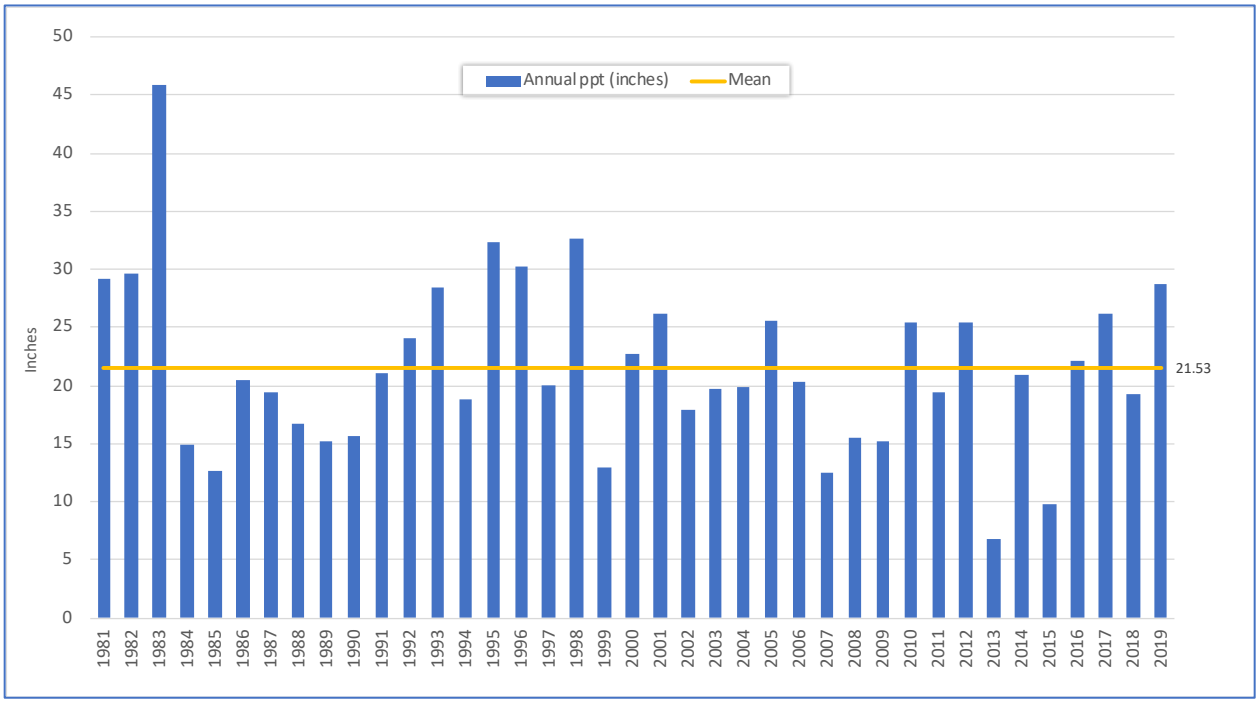
Figure 2-2: Average Climate Conditions[7]



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp	46.7	51.0	55.2	59.8	67.0	74.1	78.4	76.9	72.7	64.3	53.3	46.5
Precip	3.92	3.59	3.45	1.60	0.83	0.25	0.00	0.04	0.28	1.16	2.53	3.89
ETo	1.26	1.95	3.03	4.66	5.77	7.61	7.06	6.71	4.98	3.71	1.79	1.08

[7] Temperature and rainfall data represents annual averages from 1981-2019 from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 39.1239 Lon: -121.6174 Elev: 56ft; ETo data is from CIMIS Verona - Sacramento Valley - Station 235 from May 2012 – Oct 2020.

Figure 2-3: Annual Precipitation Variability (1981-2019)



2.1.1 Climate Change

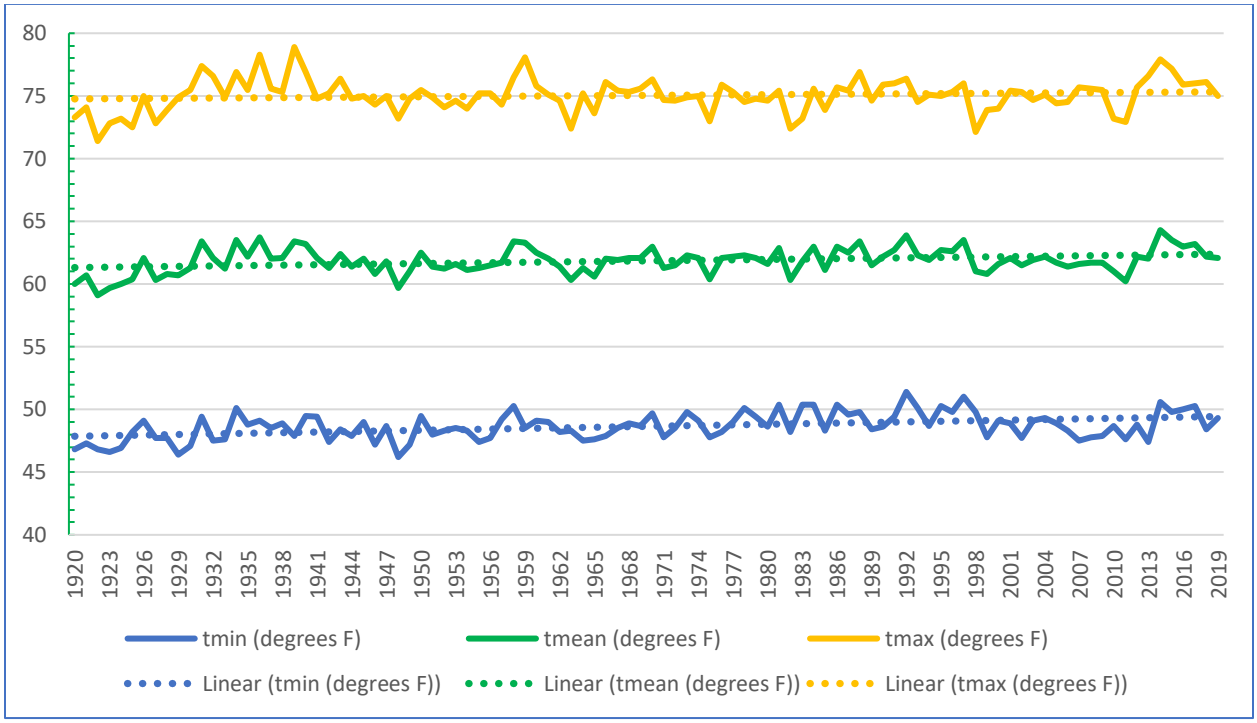
While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when assessing drought risk assessment, water conservation and use efficiency, and demand management and supply—both in a historical and projected context.

Yuba City's climate is highly variable with respect to precipitation and temperature; the dry summer months make the state extremely susceptible to drought when a deficiency in precipitation materializes, especially in mountain snowpack. Much of the water supply comes from the mountains falling as winter rain or snow and is then stored as snowpack and subsequently captured in reservoirs and appropriated throughout the year. Climate change is generally forecast to bring higher temperatures, more variability in precipitation and more frequent and prolonged droughts. Rising temperatures equate to decreasing snowpack and earlier snowmelt. The Sierra snowpack is projected to experience a 48 percent to 65 percent loss relative to the historical April 1 average by the end of the century. This will place great strain on summer and fall water supply in Yuba City and throughout the state. Increased evapotranspiration would also accompany intensification of hotter extreme temperatures.

Yuba City has experienced a general warming trend over the last 100 years, as shown by the trendlines in Figure 2-4. Since 1920, maximum and minimum temperatures have increased at a rate of 1.64 °F and

2.64 °F per 100 years, respectively. More recently, since 1975, maximum and minimum temperatures have increased at a rate of 3.99 °F and 4.17 °F per 100 years, respectively[8].

Figure 2-4: Historical Annual Temperature (1920-2019)[9]



Yuba City's 2015 UWMP (Carollo) included the Integrated Regional Water Management (IRWM) Climate Change Vulnerability Assessment. This assessment identified climate sensitivities in the service area including:

- Water use varies by 50% or more seasonally throughout the year;
- Regional wildfire vulnerability which poses a water quality concern due to erosion;
- Reliance on water bodies with current/recurrent water quality issues related to eutrophication;
- Changes in stream flows which may alter pollutant concentrations in water bodies;
- Water quality shifts due to rain events that impact treatment facility operation;
- Rivers with quantified environmental flow requirements that may be difficult to meet in the future;
- Regional hydropower which is expected to become less reliable in the future as seasonal river flows shift

[8] Western Regional Climate Center

[9] Temperature data is from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 39.1239 Lon: -121.6174 Elev: 56ft

In 2016 the City of Yuba City completed a Resource Efficiency Plan[10] (Atkins) focusing on policy, recommendations and goals that incorporate environmental responsibility, energy and resource efficiency and reduction of greenhouse gas (GHG) emissions. The plan directly addresses Federal, State, and Local regulations, citing benefits for the City including: Local Control; Energy and Resources Efficiency; Increased Public Health; Demonstrating Consistency with State GHG Reduction Goals; Meet California Environmental Quality Act (CEQA) Requirements. Recommendations for meeting reductions in GHG and energy savings include water conservation measures, public outreach, recycled water programs, and expanding allowed grey water use.

This 2020 UWMP Update includes additional Climate Change discussions in Chapter 3, Chapter 4, and Chapter 5.

2.2 Current and Projected Population, Land Use, Economy, and Demographics

Service area population and land use projections are critical to developing a useful planning framework as population dynamics and growth are a primary influence on water use. These projections directly influence planning measures for system supply, delivery, infrastructure, and demand management. Similarly, understanding the City's economic, social, and demographic trends give valuable insight to water management and planning. This section of the UWMP addresses these factors to provide a supportable basis for forecasting future water use.

2.2.1 Current Population and Historic Trends

Since incorporation in 1908 Yuba City has seen steady growth, with a notable increase in growth rate beginning after World War II. California Highway 99 runs north-south through the city and Highway 20 crosses east-west. This increased vehicular access created a thriving commercial hub in the city center. The City has also steadily annexed surrounding unincorporated land bringing population from its Sphere of Influence (SOI) into the City's official population totals.

The population of Yuba City nearly doubled every 20 years through the year 2000 and, historically, has outpaced overall Sutter County growth.[11] Table 2-2 presents the historic City population. Notably, this is the population within the City limits and does not include population within the City's SOI for which the City does provide water service. However, the City also does not provide water services to a small portion within the City limits (see Figure 2-1).

Table 2-2: Population - Historical[12]

1990	1995	2000	2005	2010	2015
27,385	34,071	36,758	57,975	64,925	66,916

[10]https://www.yubacity.net/UserFiles/Servers/Server_239174/File/Development%20Services/Resource%20Links/Resource%20Efficiency%20Plan_Final.pdf

[11] California Department of Finance, E-5 City/County Population and Housing Estimates

[12] California Department of Finance, E4 and E5 Population and Housing Estimates.

The 2015 UWMP applied a 3% growth rate to project population in five-year increments through 2040, basing the rate on a combination of the SACOG and US Census estimates. Recent data suggests that the growth rate in Yuba City has slowed and is aligning more evenly with Sutter County population growth rates. Estimates show the City's net population growth from 2010 – 2019 at 11% with an annual average rate of change over those 10 years at 1.17%.

Table 2-3: Population Growth Rate – 2010-2019 [13]

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
64,925	64,870	65,310	65,368	65,868	66,916	67,669	68,753	70,336	72,005
	-0.12%	-0.70%	0.03%	0.75%	1.58%	1.25%	1.62%	2.28%	2.43%
Net Growth 2010-2019: 11% Average Annual Growth: 1.17%									

2.2.2 Projected Population

To forecast projected service area population as accurately as possible requires consideration of the past growth rate, local economic predictions, and current and projected land uses. Importantly, one of the recent statutory updates to the UWMP Act states urban water suppliers "shall coordinate with local or regional land use authorities"[14] regarding land uses that may affect water management planning.

Table 2-4 bases City growth on the Sutter County projected population growth rate as predicted by the California Department of Finance (DoF) from 2020 to 2060.[15] This estimate presumes that the City's will mimic the projected County annual growth rate during each of the indicated 5-year increments. Notably, the City's 2020 population, as provided by DoF, decreased 2.15% from 2019 to 70,458, which became the basis for the forecast presented in Table 2-4.

Table 2-4: Population Forecast tied to DoF Forecast Growth in Sutter County

	2020	2025	2030	2035	2040	2045	2050	2055	2060
Sutter County	105,747	114,346	121,376	128,009	133,610	138,568	143,827	150,290	157,991
Annual County Growth		1.6%	1.2%	1.07%	0.86%	0.73%	0.75%	0.88%	1.0%
Yuba City (est.)	70,458	76,190	80,870	85,290	89,020	92,330	95,830	100,140	105,270

2.2.3 Current and Projected Land Use

Development in Yuba City is largely dedicated to residential and commercial zones. This type of land use tracks with its role as a service center for surrounding regional agricultural activity, and as a residential community for the locally and regionally employed population. The intersection of Highway 99 and Highway 20 has been the center of City employment with much of the commercial development being retail related. The majority of residential development is low-density, single family housing, though the

[13] California Department of Finance, E-5 City/County Population and Housing Estimates

[14] CA Water Code Section 10631(a).

[15] Growth rate calculated using CA DoF Report P-2A: Total Population Projections, 2010-2060

City also has a number of multi-family facilities. Over the past several years, the residential sector accounts for between 65% and 70% of total water consumption in the City's SOI.[16]

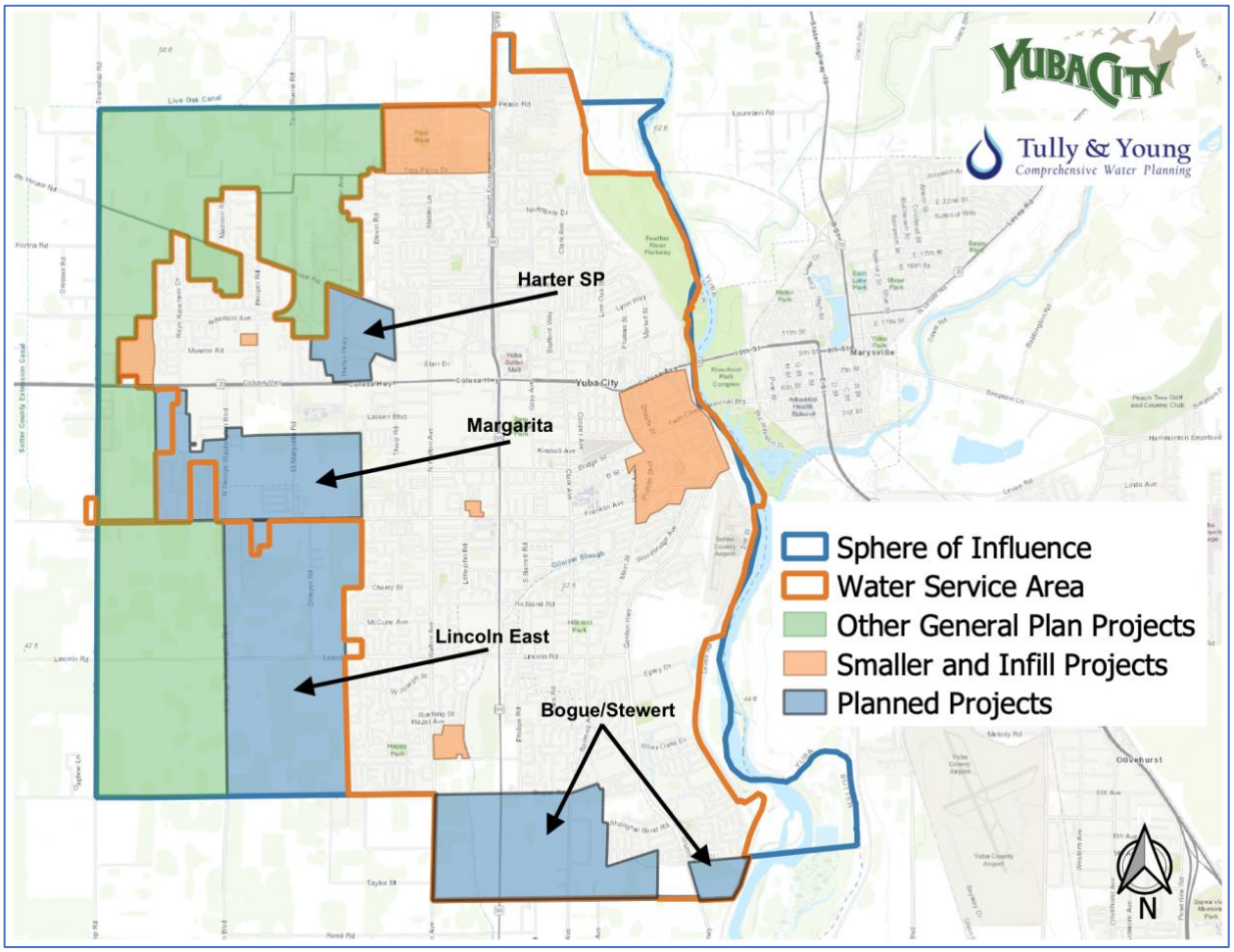
The City has previously approved or is currently or anticipates considering several development plans, including an expansion to the south of city limits in the area bounded by Bogue Road to the north and Stewart Road to the south. These projects are listed in Table 2-5 with estimated remaining or planned residential units to be constructed, and shown in Figure 2-5. Table 2-5 also estimates potential residential units to be constructed on vacant parcels within the City limits and the larger land areas in the SOI that do not currently have designated land use plans. The City anticipates from 10,000 to 15,000 new residential units will be constructed.

Table 2-5: Summary of Land Use Plans in Yuba City with Anticipated Future Residential Units

Existing or Planned Project	Estimated Remaining Units to Reach Build-out	
	Single-family	Multi-family
Bogue Stewart MP	1,758	759
Central SP	10	5
Harter SP	147	180
Lincoln East SP	3,519	1,347
El Margarita MP	895	615
Yuba Crossing MUP	53	36
Butte Vista NP	582	0
Sutter Heritage	162	
Hooper Ranch	21	0
Other Vacant in City Limits	106	40
Other Vacant in SOI (est.)	3,000	1,200
Total w/o SOI Vacant	7,254	2,981
Total with SOI Vacant	10,254	4,181

[16] Based upon reporting by the City to the SWRCB as part of monthly conservation reporting requirements. Data is available here (last accessed December 28, 2020): https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/2020dec/uw_supplier_data121620.xlsx

Figure 2-5: Existing or New Development Project Locations



2.2.4 Economic Trends & Other Social and Demographic Factors

Being the urban economic hub of Yuba and Sutter counties, Yuba City's local economy has traditionally focused on retail and commercial services for the surrounding agricultural region. While this still true, in the last 20 years the City has added strong employment in health care related services and manufacturing. As of May 2018, SACOG estimated the addition of 10,978 jobs in the City and SOI between 2012-2036.

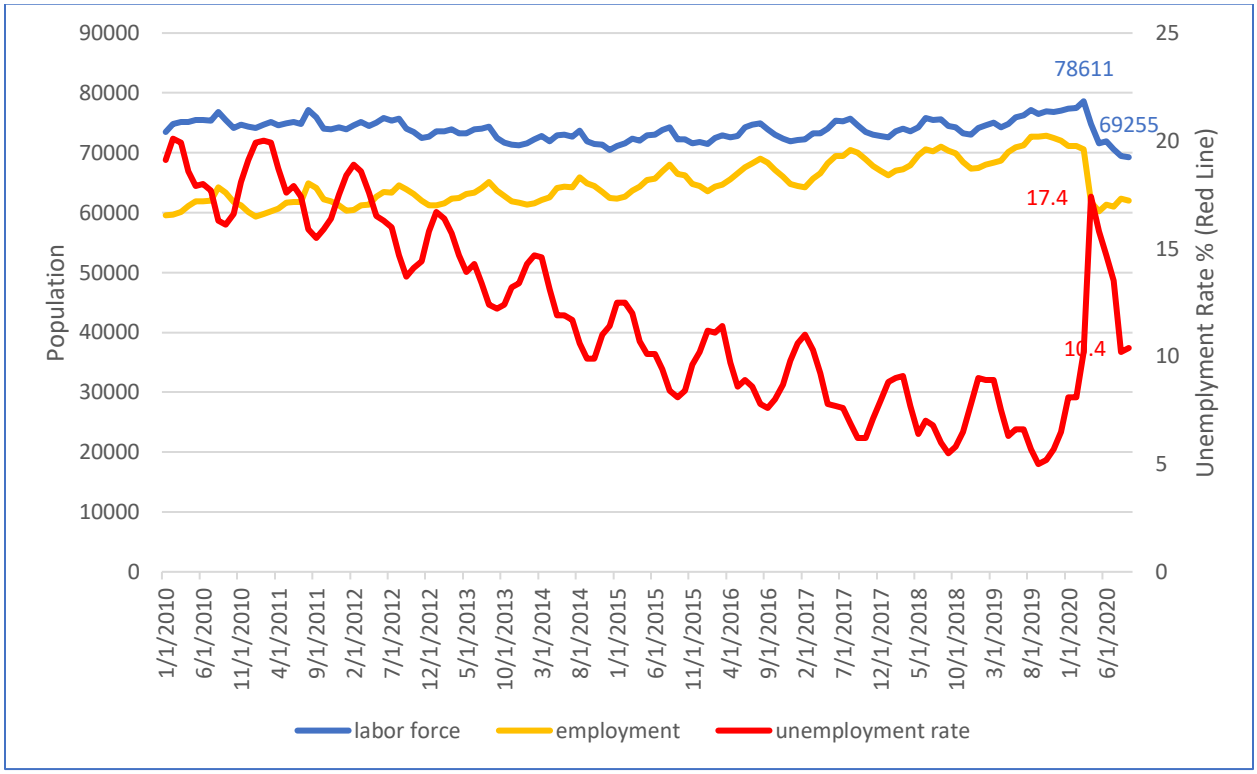
Since 2010 Yuba City has seen impressive growth adding jobs and decreasing the unemployment rate from as high as 20% in 2010 to 5% as recently as September 2019. The spring and summer also bring seasonal employment and a labor force for agricultural work in the surrounding area. It is common in the winter months to see the labor force dip and unemployment rate increase five percentage points due to this seasonality as shown in Figure 2-6[17].

[17] U.S. Bureau of Labor Statistics: https://www.bls.gov/eag/eag.ca_yubacity_msa.htm

The coronavirus pandemic has crippled the national (and global) economy in 2020 and Yuba City is no exception. The City's unemployment rate spiked to 17% in April 2020. Since then, the City has regained some of the jobs but the labor force has dropped 10% year over year and there remains a high level of uncertainty with the pace of economic recovery due to the pandemic. The Economic Development Corporation of Yuba-Sutter published a Pandemic Impact Report as of September 30, 2020 with the following findings of expectation of returning to pre-crisis "normal" operations:

- 31 percent businesses expect to return in 7-12 months,
- 20.6 percent expect to return in 13-18 months
- 19.5 percent reported return in 2-6 month,
- 12 - 13.7 percent business have returned to pre-crisis operations,
- 12.6 reported years, if ever, expecting a return to pre-crisis operations

Figure 2-6: Yuba City Employment Data



According to the 2010 US Census, the ethnic makeup of Yuba City is 58% White, 28% Hispanic/Latino, 17% Asian, 2.5% African American, 22% other races or mixed race, including a strong Sikh Indian population that along with Mexican immigrants were the first ethnic groups to settle in Yuba City.

Yuba City's median household income is $54,506 which gives it a Disadvantaged Community status according to the DWR mapping tool. The designation is based on the median household income being less than 80% of the State's median household income. The mapping context is in order to provide funding pursuant to California Proposition 1 "Water Quality, Supply, and Infrastructure Improvement Act of 2014", Proposition 84, Integrated Regional Water Management (IRWM) Grant Program, and likely other forthcoming state assistance programs.

CA Department of Finance estimates there are 23,779 housing units in Yuba City, with an average occupancy of 3.11 persons per household.[18]

2.2.5 Expected Population Based Upon Land-Use Planning

While the City has a projected population based upon the County's rate of growth and an expected number of new residential units, the projection may not truly reflect the population projections.

With an average occupancy equal to the current rate of 3.11 people per household, the additional 35,000 residents anticipated by 2060 (see Table 2-4) would require about 11,250 new residential units – a combination of single family and multi-family homes. This is in the range of anticipated housing based upon the known and anticipated developments (see Table 2-5). To estimate the number of new housing for each 5-year increment of the UWMP's 25-year planning horizon, the City's history of issuing new housing permits is useful. As shown in Table 2-6, the City has had periods of rapid building in the early 2000's but has only averaged less than 40 new housing permits a year for the past 10 years. Based on these conditions, the estimated 11,250 new housing starts would take a long time.

Table 2-6: Yuba City Historic Annual New Housing Starts

Year	Housing Starts	Year	Housing Starts
2000	135	2011	14
2001	358	2012	14
2002	589	2013	50
2003	750	2014	50
2004	991	2015	45
2005	839	2016	47
2006	254	2017	38
2007	158	2018	32
2008	53	2019	47
2009	33	2020	22
2010	18		
		20-year Average =	216
		Average last 10 year =	36

To represent a plausible rate of new housing for purposes of this UWMP, the City is anticipating a higher rate than the last decade, that increases slightly during each 5-year planning horizon increment starting at a rate of 150 new houses per year, growing to 300 per year. Table 2-7 presents the resulting new housing starts and forecast population expected based upon this assumed rate of housing. These assumptions do not differentiate between the listed projects in Table 2-5, however. The cumulative housing will be used to forecast future water use as detailed in Section 4.

[18] California Department of Finance, E-5 City/County Population and Housing Estimates

Table 2-7: Forecast Residential Housing, Population and Growth Rate

Category	Forecast				
	2025	2030	2035	2040	2045
Assumed Annual Housing Starts	150	200	250	300	300
Total Housing Starts over 5-years	750	1,000	1,250	1,500	1,500
Single-Family Units Added (75% of total)	563	750	938	1,125	1,125
Multi-family Units Added (25% of total)	188	250	313	375	375
Cumulative New Housing Units	750	1,750	3,000	4,500	6,000
Forecast Population (at 3.11 occupancy)	72,791	75,901	79,788	84,453	89,118
Resulting Average Annual Growth Rate	0.65%	0.84%	1.00%	1.14%	1.08%

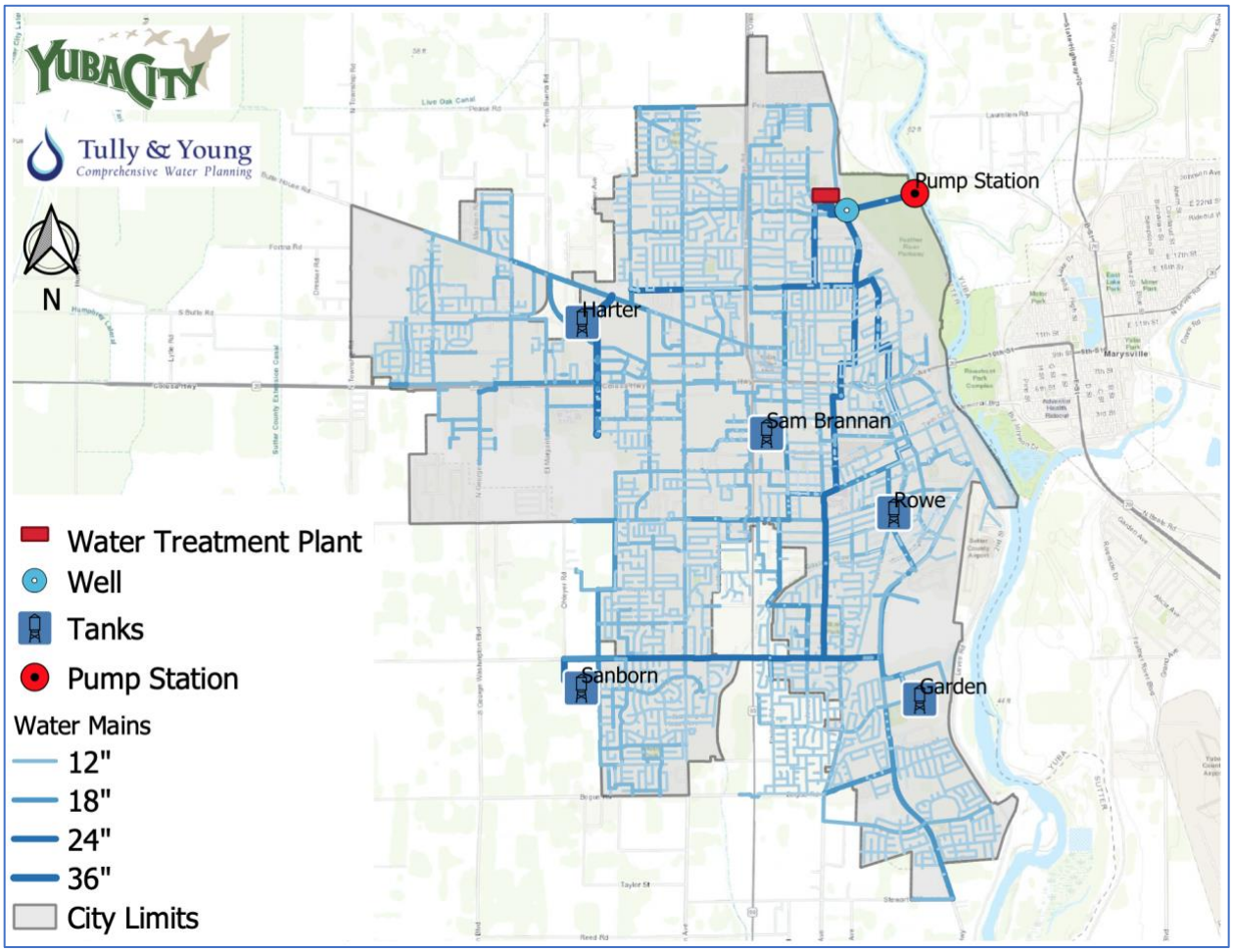
2.3 Delivery System Details

This subsection focuses specifically on Yuba City's potable water delivery system. The water supplies delivered through this system are described in Section 3, with water uses described in Section 4.

The City operates a potable water system to provide water service to its customers. Figure 2-7 represents the major features of this system, including the City's diversion on the Feather River, its water treatment plant, and the numerous pipes, storage tanks and pump stations. The potable water distribution system is a single pressure zone with approximately 275 miles of pipeline, a High Lift Pump Station (HLPS), and five booster pump stations that pump from five ground level tanks. At this time, the City's system includes one backup/standby groundwater well located at the YCWTP, which periodically is used as a raw water source and fed into the treatment plant. Additional groundwater wells are being contemplated but currently are not integrated into the City's system (see Chapter 3).

In 2001 the City acquired the Hillcrest Water Company (HWC) which operated in four regions within the City's sphere of influence. The HWC system included approximately 4,600 service connections and 13 active groundwater wells. The City provided groundwater from some of the HWC wells to customers through September 2010 but completed transition of all customers to surface water from the Yuba City Water Treatment Plant (YCWTP) in October 2010. All of the HWC wells are now inactive. However, the City is considering rehabilitation of three wells from the HWC system for additional emergency water supply, in addition to planning for a second well at the YCWTP site. Further information regarding this supply option is provided in Section 3.

Figure 2-7: Existing Potable Water System



Water delivery begins with the system's Low Lift Pump Station (LLPS) and raw water pipe intakes in the Feather River which convey water to the YCWTP. The YCWTP has a firm capacity of 30 million gallons per day (mgd), with two filtration systems. The original, which has been in service since 1969, includes a pretreatment system, four rapid sand filters, and a chlorine disinfection system. A new membrane filtration system installed in 2007 operates in parallel with the original system and includes a new 4 million-gallon baffled clearwell for disinfection contact time. There are two wash water percolation basins which process approximately 500,000 – 600,000 gallons of water per day.

The 275 miles of distribution pipelines generally are sized from 2 to 12 inches in diameter, with transmission mains ranging from 14 to 36 inches. About 55% of the pipes are made of Asbestos Cement and 27% Ductile Iron Pipe. Cast Iron, PVC, Steel Cement Line Coated, and Galvanized Iron Pipe make up the majority of the rest. The City uses a Supervisory Control and Data Acquisition (SCADA) System to monitor and control the water distribution system and facilities.

At the YCWTP, spent filter backwash water, filter-to-waste water, sedimentation basins' sludge, and membrane systems' backwash water are discharged to one of the two spent backwash water basins located to the north of the pretreatment trains. The spent backwash water is currently not recovered

and recycled as part of the water treatment process. Spent backwash and back-pulse water is pumped from the sump to percolation ponds for percolation into the soil and solids dewatering. The opportunity to recover about 80 MG annually from this backwash water would require YCWTP facilities upgrades that comply with EPA's Filter Backwash Recycling Rule (FBRR) and also California's Cryptosporidium Action Plan (CAP).

No infrastructure or systems currently exist to support recycled water within the City's distribution system. However, the City's wastewater treatment plant uses a small quantity of treated wastewater effluent for irrigating onsite landscaping and plant processes (see Chapter 3).

2.4 Energy Intensity

Among the new statutory requirements for 2020 UMWPs is "Energy Intensity Reporting". An urban supplier shall include information it can readily obtain related to the energy used to produce, treat and deliver water.[19] "Energy Intensity" is defined as: total amount of energy expended in kilowatt-hours (kWh) by the urban water supplier on a per acre-foot basis to take water from the location where the urban water supplier acquires the water to its point of delivery.

For purposes of the 2020 UWMP, the City uses the Total Utility Approach for reporting its energy intensity. This method sums the annual energy consumed for all water management processes, divided by total volume of water in acre feet. These processes include diversion, treatment, and distribution, as applicable. The total energy intensity is reported in Table 2-8.

Table 2-8: Energy Intensity – Total Utility Approach

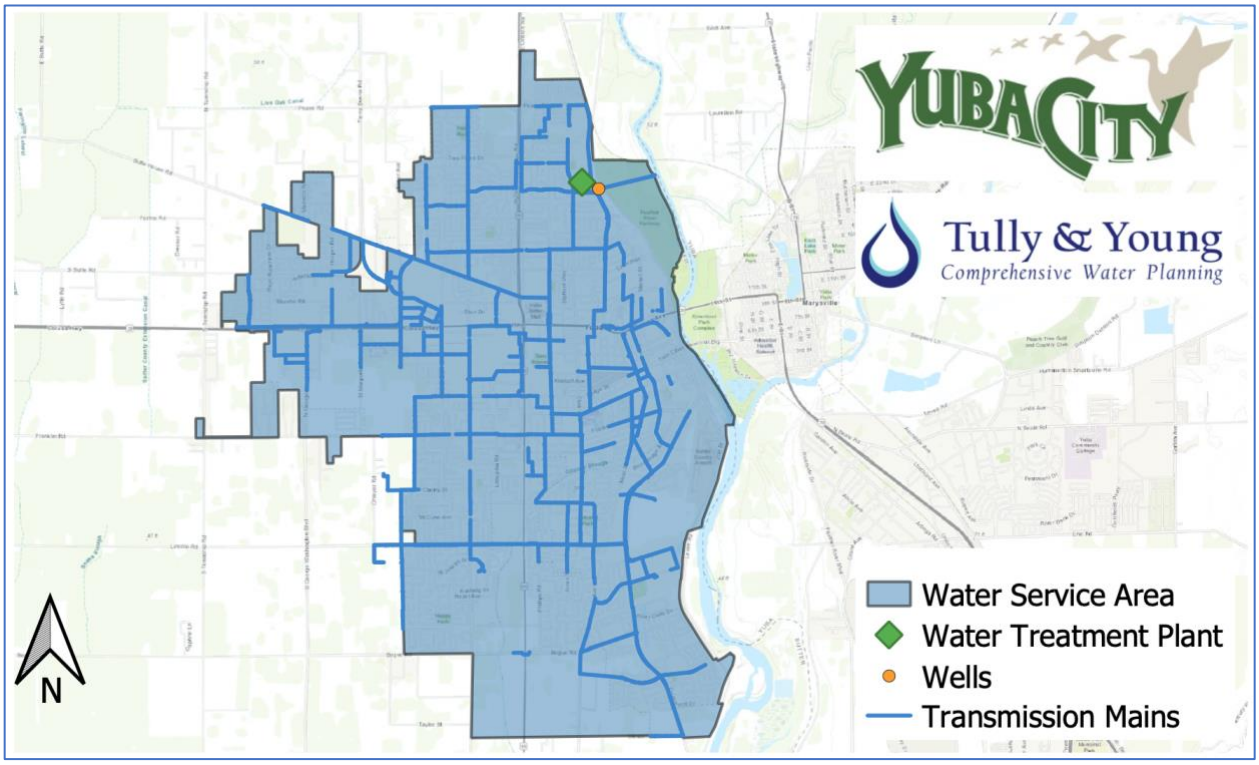
Sum of All Water Management Processes	
Volume of Water Entering Process (acre-feet)	15,271
Energy Consumed (kWh)	5,570,060
Energy Intensity (kWh/acre-foot)	365

[19] California Water Code Section 10631.2(a).

Chapter 3
Water Supply

The City of Yuba City has numerous water supply sources that serve its customers. The City's diverse surface water supplies – derived from water rights and contracts – provide significant *annual* volumes of water that can be used to meet end user demands. However, the details imbedded in each water right and contract impact the monthly availability of each surface supply source. This limited availability requires the City to carefully manage its water supply portfolio in order to have sufficient water supply available in extended drought periods. The City also has access to groundwater resources and anticipates additional diversification of its supply portfolio in order to maximize the utility of these resources. Furthermore, the City's water supply portfolio has additional administrative matters that require resolution in order to support the long-term reliability projections. This section describes the City's water supply portfolio and identifies the key components within each water asset that impact the City's long-term water supply reliability. Figure 3-1 shows the Yuba City service area and key water supply features.

Figure 3-1: Yuba City Service Area and Key Water Supply Features



3.1 Surface Water Supplies

The City has two water supply contracts and two water rights that constitute the City's surface water supply portfolio. In each year, the City must collectively manage all four surface water assets in order to optimize the utility of each surface water asset – especially in times of water shortage. The City's four surface water supplies are: (1) State Water Project contract; (2) State Water Resources Control Board water right license; (3) State Water Resources Control Board water right permit; and (4) contract with North Yuba Water District. All of these supplies have management opportunities and constraints that must be synthesized in each year to ensure maximum utility. This section describes the details of each surface water supply and projects the availability of these supplies through 2045 under normal year, single dry year, and five consecutive dry year conditions.

3.1.1 Yuba City State Water Project Contract

The City holds a State Water Project Contract (SWP Contract) to obtain water supplies derived from the SWP. The California State Water Project (SWP) was created in 1957 following the devastating floods that inundated great portions of the Sacramento Valley. In 1960, under the Burns-Porter Act (also known as the California Water Resources Development Bond Act), the SWP was funded for construction and most facilities were completed by 1973. The State Water Project is the largest state-built, multi-purpose water project in the country. Today, the SWP includes 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts.

The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. The water flowing in the Feather River is captured by the SWP in Oroville dam and reservoir. Storage released from Oroville Dam flows down the Feather River and then the Sacramento River until it reaches the Sacramento-San Joaquin River Delta (Delta). The SWP diverts, stores, and distributes water to 29 agricultural and urban suppliers throughout Northern, Central and Southern California. Approximately 70 percent of the SWP supply is contracted for urban uses and 30 percent is contracted for agriculture. The diversion rights are based upon State Water Resources Control Board issued appropriative water rights with 1927 priority dates.

The total planned annual delivery capability of the SWP and the sum of all contractors' maximum Table A Amounts was originally 4.23 million acre-feet. The initial SWP storage and conveyance facilities were designed to meet contractors' water demands with the construction of additional storage facilities planned as demands increased. However, few additional SWP storage facilities have been constructed since the early 1970s and a portion of the original conveyance design was never completed. SWP conveyance facilities were generally designed and have been constructed to deliver Table A to all contractors. The maximum Table A Amounts of all SWP contractors now totals about 4.133 million AF.[20]

The City is one of the 29 water suppliers that executed a State Water Project Contract with the California Department of Water Resources. The original SWP Contract was signed in 1963 and includes numerous amendments. In 2003, DWR prepared an aggregated agreement that attempted to incorporate all of

[20] The Final State Water Project Delivery Capability Report, DWR, August 2020 at 30.

the amendments that were added to the City's SWP Contract through 2013. However, DWR disclaims legal validity of the consolidated document by stating that:

> [the 2013 document] is intended only to provide a convenient reference source, and the Department of Water Resources is unable to provide assurances that this integrated version accurately represents the original documents. For legal purposes, or when precise accuracy is required, users should direct their attention to the original source documents rather than this integrated version.

As such, the City's SWP Contract and its amendments should be consulted when assessing each component of the City's SWP water assets.

The City has a Table A Amount of 9,600 acre-feet annually under its SWP Contract (Table A). The Table A represents the maximum amount of water that is available to the City through the SWP Contract. The SWP Contract may be subject to shortages that require all SWP contractors to reduce water supply deliveries. Although the primary source of the SWP water for the City's allocation is Lake Oroville, additional SWP facilities – including San Luis Reservoir, located south of the Sacramento-San Joaquin Reservoir – also contribute to the City's ability to utilize SWP water assets. Since 2010, the City has received the following SWP Table A Allocations listed in Table 3-1.

Table 3-1: Yuba City Table A Allocations 2010-2020 (AFY)

Year	Table A Allocation	% Allocation	Amount Used
2010	4,800	50%	2,331
2011	7,680	80%	2,297
2012	6,240	65%	2,694
2013	3,360	35%	3,359
2014	480	5%	480
2015	2,400	25%	2,400
2016	7,200	75%	1,229
2017	9,600	100%	1,746
2018	4,800	50%	1,715
2019	8,160	85%	1,655
2020	2,880	30%	1,812

DWR has noted that it is less likely that 100% allocation years will occur on a regular basis in the future. In August 2020, DWR finalized the "2019 SWP Delivery Capability Report" (DCR) that outlined the probable future water supply allocations for the SWP system. The DCR showed variations in future Table A deliveries based upon hydrological and regulatory conditions. These conditions are summarized in Table 3-2 below.

Table 3-2: SWP Estimated Table A Deliveries from DCR (TAF)

Year	Long Term Average		Single Dry Year (1977)		Dry Periods							
					2 Year Drought (1976-1977)		4-Year Drought (1931-1934)		6-Year Drought (1987-1992)		6 Year Drought (1929-1934)	
2017 Report	2,571	62%	336	8%	1,206	29%	1,397	34%	1,203	29%	1,408	34%
2019 Report	2,414	58%	288	7%	1,311	32%	1,228	30%	1,058	26%	1,158	28%

As shown in Table 3-2, DWR's long-term average reliability shows a downward trend from 62% in the 2017 SWP DCR to 58% in the 2019 DCR. However, as a result of the North of Delta Settlement (December 31, 2013), the North of Delta (NOD) allocation should be larger than the identified reliability described in the 2019 DCR. Specifically, the NOD allocation should increase the future annual Table A allocation by approximately 10%. Accordingly, the City will incorporate the NOD allocation bump in considering its long-term water supply availability of 68%. Table 3-3 depicts the City's Future Table A Projected Normal Year Water Year Deliveries.

Table 3-3: SWP Future Table A Projected Normal Water Year Deliveries (AFY)

Year Type	Table A Allocation	% Allocation
Normal Year	6,528	68%

The 2017 and 2019 DCR depict the single driest year as 1977 with an 8% allocation estimate in 2017 and a 7% allocation estimate in 2019. The single lowest historical SWP allocation occurred in 2014 at 5% as shown in Table 3-1 and is occurring again in 2021. Although the City anticipates the NOD allocation applying in critically dry years, out of an abundance of caution and in accordance with the 2021 SWP allocation, the City will assess a critically dry year at 5% allocation. In dry years that are less severe than critically dry years, however, the City will increase this baseline number by 10% in accordance with the North of Delta Settlement.

The DCR also identifies various drought periods for purposes of characterizing SWP allocation percentages that would accompany those drought periods. The averaging of the allocations over the course of the drought period is not representative of supply scenarios that reasonably accommodate the City's drought plans in light of climate change and regulatory uncertainty. As such, the City will use the following drought characterization for its short-term and long-term planning, incorporating both the 2021 critical year allocation and the NOD Allocation adjustment: year 1 at 45%; year 2 at 30%; year 3 at 5%; year 4 at 15%; and year 5 at 30%. This characterization reasonably represents a projected drought over a five consecutive year period. Table 3-4 shows the Table A allocation over five consecutive dry years from 2021-2025. It is important to note that the Table A allocation in each year is reduced by 50% so that the remaining portion may be used as "Carryover Water" for future uses in other years (see Section 3.1.2).

Table 3-4: SWP Allocation for Five Consecutive Dry Years from 2021-2025 (AFY)

Table A Allocation	Year Type	Amount
	Normal	3,264
	Single Dry Year	240
Multi-Year Drought	Year 1	2,160
	Year 2	1,440
	Year 3	240
	Year 4	720
	Year 5	1,440

Table A supply reliability has also been examined over the broader planning horizon considered in this 2020 UWMP. Table 3-5 shows the normal year, single dry year, and five consecutive dry years planned SWP Table A Allocation for the City of Yuba City through 2045.

Table 3-5: Future SWP Allocations by Year Type Through 2045 (AFY)

Table A Allocation	Year Type	2025	2030	2035	2040	2045
Normal		3,264	3,264	3,264	3,264	3,264
Single Dry Year		240	240	240	240	240
Multi-Year Drought	Year 1	2,160	2,160	2,160	2,160	2,160
	Year 2	1,440	1,440	1,440	1,440	1,440
	Year 3	240	240	240	240	240
	Year 4	720	720	720	720	720
	Year 5	1,440	1,440	1,440	1,440	1,440

The characterizations of the City's SWP Table A Allocation long-term reliability reflect numerous hydrological and regulatory issues that inform the DCR modeling, are reasonable assessments related to SWP system management, and reflect the City's local conditions. Long-term hydrological and regulatory issues that affect the water management include the Bay-Delta Water Quality Control Plan, the Coordinated Operations Agreement, the Delta Biological Opinion, modifications to San Luis Reservoir, SWP Seismic considerations, DWR's Emergency Planning, and assessments related to the City's local conditions and climate change. These issues are all considered in the City's planning incorporated into it supply characterizations in this 2020 UWMP.

3.1.2 SWP Carryover Supplies

The City's SWP Contract allows it to forego use of its allocated SWP Table A supply and retain a portion of that allocated supply in storage for future use. This retained supply is termed "Carryover" and is governed under Article 56 of Yuba's SWP contract. Carryover water is water that is released from Oroville dam and reservoir, re-diverted at the Delta, and then stored in San Luis Reservoir – an offstream reservoir located just outside the City of Santa Nella at the junction of Interstate 5 and California State Highway 152. San Luis Reservoir is jointly owned and operated by the state and federal governments

and all SWP contractors may use the storage facility to manage Carryover water supplies. In short, the San Luis Reservoir receives, regulates, and stores exported water derived from the State Water Project and Federal Central Valley Project.

The amount of Carryover water that the City may store in any given year is subject to a set of rules that implicate all SWP contractors throughout California. In brief, the City delivers its Table A supplies to Carryover in San Luis Reservoir with an expectation that it will be able to divert all or a portion of these supplies in a subsequent year. In the event that water supplies are abundant, San Luis Reservoir may "spill." When San Luis Reservoir reaches a "spill" stage, DWR releases the City's Carryover in accordance with the aforementioned rules as they apply in the context of all entities with stored water in San Luis Reservoir. Nevertheless, the City generally retains a portion of its Table A Allocation as Carryover in any given year and continues to maintain a Carryover balance. Table 3-6 shows the City's Carryover balance from 2010 through 2020.

Table 3-6: Yuba City Historic SWP Carryover (AFY)

Year	Carryover	**Used**
2010	0	0
2011	0	0
2012	0	0
2013	1,491	1,491
2014	6,855	4,141
2015	3,154	604
2016	2,550	0
2017	0	0
2018	4,800	0
2019	5,485	0
2020	4,800	0

The City will have access to its Table A Carryover supplies in future years based upon the hydrological and regulatory conditions. The Table A Carryover supplies result from a number of variables that are both tied to the SWP Table A annual percent allocation, operations in San Luis Reservoir, and water supply management by the City. The City conservatively estimates that its future Carryover supplies will equate to approximately fifty percent (50%) of its Table A Allocation in any given year type. Thus, in a normal year, where Table A Allocations are predicted to be 68%, the City expects the carryover supply to be approximately 50% of 6,528 acre-feet or 3,264 acre-feet. In a single dry year, the Carryover supply is expected to remain at 3,264 as a remnant of a previous normal year carryover action. However, Carryover supply decreases over time as it relates to the previous year's Table A Allocation. Thus, for five consecutive dry years, the pattern for Carryover presented in this UWMP would be 50% of the previous year's Table A Allocation. Importantly, however, the City will manage these supplies over the five-year drought planning horizon to satisfy the City's demands in light of other constraints on other

water resources.[21] In other words, the Carryover supply need not be used in the next year it is available but may be managed throughout the five year drought planning scenario (see Section 3.8). Table 3-7 shows the representative Table A Carryover supplies in normal, single dry, and five consecutive dry years from 2021 through 2025. Table 3-8 shows the representative Table A Carryover supplies from 2025 through 2045.

Table 3-7: Future Available Table A Carryover Supplies from 2021 Through 2025 (AFY)

Table A Allocation	Year Type	Amount
	Normal	3,264
	Single Dry Year	3,264
Multi-Year Drought	Year 1	3,264
	Year 2	2,160
	Year 3	1,440
	Year 4	240
	Year 5	720

Table 3-8: Future Available Table A Carryover Supplies Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		3,264	3,264	3,264	3,264	3,264
Single Dry Year		3,264	3,264	3,264	3,264	3,264
Multi-Year Drought	Year 1	3,264	3,264	3,264	3,264	3,264
	Year 2	2,160	2,160	2,160	2,160	2,160
	Year 3	1,440	1,440	1,440	1,440	1,440
	Year 4	240	240	240	240	240
	Year 5	720	720	720	720	720

3.1.3 Water Right License 13855

The City holds State Water Resources Control Board (SWRCB) issued appropriative water right License 13855. License 13855 has a priority date of March 5, 1958 and may be diverted from the Feather River from January 1 through July 1 and September 1 through December 31 each year with a maximum diversion rate of 15.6 cubic feet per second (cfs) and total volume not to exceed 6,500 acre-feet per year.[22] The water supply may be used for municipal purposes anywhere in the City's Sphere of Influence "Based on 2004 Updated General Plan."[23]

[21] Carryover supplies in the State Water Project system are managed to address water supply shortages when direct diversion rights are insufficient to satisfy demands. Moreover, the Carryover supplies may have applicability over the course of many years after they are designated for carryover.

[22] License for Diversion and Use of Water 13855, State of California Environmental Protection Agency, State Water Resources Control Board, December 9, 2011 (License 13855) at 1.

[23] License 13855 at 1.

The water supply under License 13855 is generally reliable on a monthly timestep in normal years. Although the supply is never available in July and August, the relatively young priority date of 1958 renders this water right susceptible to curtailment in certain dry years. Specifically, the water right was curtailed in 2014 and 2015 and has been again curtailed in 2021. Thus, the likelihood that the water supply will be curtailed in the future may increase in dry conditions as system demands increase, runoff patterns change from climate conditions, and regulatory conditions limit diversions during certain times of year. Accordingly, in single dry and multiple dry years, the water asset may be unavailable beyond the monthly diversion limitations noted in the license.

The City has continued to use this water right each year in accordance with the terms and conditions contained in the license language. Table 3-9 shows the City's the use under License 13855 since 2010.

Table 3-9: City Use Under License 13855 Since 2010

Year	L 13855	Used
2010	6,500	1824
2011	6,500	1,813
2012	6,500	6,500
2013	6,500	5,659
2014	6,500	3,534
2015	6,500	1,393
2016	6,500	2,855
2017	6,500	1,580
2018	6,500	3,128
2019	6,500	1,340
2020	6,500	4,292

The City will continue to use this water supply into the future to meet the demands in its service area. The reliability of this supply in dry conditions depends upon the climatological conditions and the applicable regulatory standards imposed by the SWRCB. In order to reflect these conditions, the monthly availability of License 13855 is depicted in Table 3-10 below through 2025 and the total annual availability through 2045 is depicted in Table 3-11.

Table 3-10: Monthly Availability of License 13855 Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal		650	650	650	650	650	650	0	0	650	650	650	650
Single Dry Year		928	928	928	928	928	0	0	0	0	0	928	928
Multi-Year Drought	2021	650	650	650	650	650	650	0	0	650	650	650	650
	2022	650	650	650	650	650	650	0	0	650	650	650	650
	2023	928	928	928	928	928	0	0	0	0	0	928	928
	2024	650	650	650	650	650	650	0	0	650	650	650	650
	2025	650	650	650	650	650	650	0	0	650	650	650	650

Table 3-11: Annual Availability of License 13855 Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		6,500	6,500	6,500	6,500	6,500
Single Dry Year		6,500	6,500	6,500	6,500	6,500
Multi-Year Drought	Year 1	6,500	6,500	6,500	6,500	6,500
	Year 2	6,500	6,500	6,500	6,500	6,500
	Year 3	6,500	6,500	6,500	6,500	6,500
	Year 4	6,500	6,500	6,500	6,500	6,500
	Year 5	6,500	6,500	6,500	6,500	6,500

3.1.4 Water Right Permit 18558

The City holds State Water Resources Control Board (SWRCB) issued appropriative water right Permit 18558. Permit 18558 has a priority date of 1978 and may be diverted from the Feather River from January 1 through June 30 and October 1 through December 31 each year with a maximum diversion rate of 21 cubic feet per second (cfs) and total volume not to exceed 9,000 acre-feet per year.[24] The water supply may be used for municipal purposes anywhere in "Yuba City's Sphere of Influence Based on 2004 Updated General Plan."[25]

The water supplies under Permit 18558 are less reliable than the water supplies than other City surface supplies because Permit 18558 includes both months where diversions are not allowed (July through September) but is also subject to "Term 91." Term 91 is a special Permit condition that further limits the utility of SWRCB issued appropriative water rights. Term 91 is declared by the SWRCB when it is determined that the SWP and U.S. Bureau of Reclamation's Central Valley Project (CVP) are required to release stored water in excess of low natural flow to meet Sacramento Valley in-basin uses plus export demands. In short, when Term 91 is activated, the City is denied water under Permit 18558.

Table 3-12 shows the water use under Permit 18558 since 2010. Term 91 was declared in water years 2016, 2018, and 2020.

[24] Amended Permit 18558 for Diversion and Use of Water, SWRCB Division of Water Rights, April 24, 2012 (Permit 18558) at 1-2.
[25] Permit 18558 at 2.

Table 3-12: Last Five Years of Water Use Under Permit 18558

Year	Permit 18558 Use
2010	8,847
2011	9,000
2012	5,068
2013	4,333
2014	614
2015	3,738
2016	6,244
2017	8,546
2018	6,490
2019	8,722
2020	5,566

In light of the climatological trends that appear to be changing runoff patterns for surface water supplies as well as the tightening regulatory requirements in meeting water quality conditions in the Sacramento-San Joaquin Bay Delta (Delta), Term 91 is likely to be declared more often in the future and may have duration that lasts beyond the historical pattern. Thus, for purposes of this UWMP, the City has taken a conservative approach to Term 91 activation by showing it active in six or seven months in the five consecutive dry year scenario. Table 3-13 shows the projected monthly availability of Permit 18558 in normal, single dry, and five consecutive dry year conditions through 2025. Table 3-14 shows the annual availability through 2045.

Table 3-13: Monthly Availability of Permit 18558 Through 2025

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal		1,125	1,125	1,125	1,125	1,125	0	0	0	0	1,125	1,125	1,125
Single Dry Year		1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291
Multi-Year Drought	2021	1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291
	2022	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291
	2023	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291
	2024	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291
	2025	1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291

Table 3-14: Annual Availability of Permit 18558 Through 2045

Year Type		2025	2030	2035	2040	2045
Normal		9,000	9,000	9,000	9,000	9,000
Single Dry Year		7,539	7,539	7,539	7,539	7,539
Multi-Year Drought	Year 1	7,539	7,539	7,539	7,539	7,539
	Year 2	6,290	6,290	6,290	6,290	6,290
	Year 3	6,290	6,290	6,290	6,290	6,290
	Year 4	6,290	6,290	6,290	6,290	6,290
	Year 5	7,539	7,539	7,539	7,539	7,539

3.1.5 North Yuba Water District Contract (Permit 11518 Terms)

In 2010, the City and North Yuba Water District (District) entered an agreement to extend the existing water supply agreement between the City and District through 2035 (Agreement).[26] The Agreement authorizes the District to provide up to 4,500 acre-feet of water per year on a prescribed monthly delivery schedule from April through October.[27] The City has the ability to alter the monthly delivery schedule and the District will use its "best efforts" to accommodate the City's requests for changes. The water made available under the Agreement is for domestic, municipal, and industrial purposes for uses at locations that are "both within the City's service area and within the authorized place of use specified in Amended Permit 11518."[28]

SWRCB issued appropriative water right Amended Permit 11518 (Permit 11518)[29] is an important component of the Agreement. Permit 11518 was issued to the District under Application 14113 with a priority date of December 28, 1950. The District is entitled to divert water from the Feather River, South Fork Feather River, and Lost Creek for irrigation, domestic, municipal, and industrial purposes. As Permit 11518 applies to the City, the water may be used for the identified purposes within Yuba City "as shown on maps dated July 1958, December 1988, and August 2000 filed with the State Water Board."[30] Importantly, the uses of the water for municipal and industrial purposes required compliance with Permit Condition 9 which states that use is "subject to Permittee's submission of water conservation plans that meet the requirements for an urban water management plan…."[31] In addition, Permit 11518 has specific requirements related to filing Progress Reports as they align the water supplies with direct diversions and rediversion of stored water.[32] A short review of the 2020 Permit Progress Report filed by the District indicates that all water diverted under Permit 11518 was reportedly used for irrigation purposes.[33]

Table 3-15 shows the last five years of the City's *monthly* water use under the Agreement with the District. The table shows some general changes in the usage demand pattern that varies from the delivery pattern identified in the Agreement.

[26] Amended Agreement for Sale of Surplus Water between North Yuba Water District and the City of Yuba City, May 20, 2010 (Agreement).
[27] Agreement at 5(a).
[28] Agreement at 5(b).
[29] Permit For Diversion and Use of Water, Amended Permit 11518, State of California Environmental Protection Agency State Water Resources Control Board, April 27, 2006 (Permit 11518).
[30] Permit 11518 at 2.
[31] Permit 11518 at 3.
[32] Permit 11518 at 4 and 5.
[33] The City's water usage clearly indicates that water under the Agreement (and thus Permit 11518) was used for Domestic, Municipal, and Industrial purposes as well as irrigation purposes. This inconsistency should be coordinated with the District.

Table 3-15: Last Five Years Monthly Water Use Under Agreement Between City and District (AFY)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	0	0	0	0	0	496	922	922	513	175	0	0	3,028
2017	0	0	0	0	0	0	922	922	648	0	0	0	2,492
2018	0	0	0	0	0	721	922	922	575	273	32	0	3,445
2019	0	0	0	0	0	0	922	922	391	0	0	0	2,235
2020	0	0	0	0	0	625	922	922	616	361	133	22	3,601

Table 3-16 shows the anticipated monthly water use of the Agreement water supplies in varying year types through 2025 as shown in the schedule of deliveries in the Agreement. Table 3-17 shows the anticipated annual water use of the Agreement water supplies in varying year types through 2045, assuming the Agreement is extended for the additional 10 years.

Table 3-16: Projected Monthly Water Supplies Under Agreement Through 2025

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal		0	0	0	181	492	893	922	922	714	376	0	0
Single Dry Year		0	0	0	181	492	893	922	922	714	376	0	0
Multi-Year Drought	2021	0	0	0	181	492	893	922	922	714	376	0	0
	2022	0	0	0	181	492	893	922	922	714	376	0	0
	2023	0	0	0	181	492	893	922	922	714	376	0	0
	2024	0	0	0	181	492	893	922	922	714	376	0	0
	2025	0	0	0	181	492	893	922	922	714	376	0	0

Table 3-17: Projected Annual Water Supplies Under Agreement Through 2045

Year Type		2025	2030	2035	2040	2045
Normal		4,500	4,500	4,500	4,500	4,500
Single Dry Year		4,500	4,500	4,500	4,500	4,500
Multi-Year Drought	Year 1	4,500	4,500	4,500	4,500	4,500
	Year 2	4,500	4,500	4,500	4,500	4,500
	Year 3	4,500	4,500	4,500	4,500	4,500
	Year 4	4,500	4,500	4,500	4,500	4,500
	Year 5	4,500	4,500	4,500	4,500	4,500

3.2 Groundwater Supplies

Groundwater supplies are a less significant component of the Yuba City's water supply portfolio. The groundwater supplies are derived from Yuba City's groundwater production facilities. This section provides a description of the groundwater basin, characterizes the management structures related to various areas in the groundwater basin, and quantifies supplies available to the City from the groundwater basin.

3.2.1 Groundwater Basin[34]

Yuba City derives its groundwater supplies from the Sutter Subbasin of the Sacramento Valley Groundwater Basin. The Sutter Subbasin (5-21.62) covers approximately 366 square miles and is defined as the area bounded on the north by the confluence of Butte Creek and the Sacramento River and Sutter Buttes, on the west by the Sacramento River, on the south by the confluence of the Sacramento River and the Sutter Bypass, and on the east by the Feather River. The subbasin lies entirely within the Sacramento River watershed with the most notable hydrological features being the Sacramento and Feather Rivers. Other notable features are Tisdale Bypass and Sutter Bypass. The manmade Sutter Bypass acts as a flood control overflow for the Sacramento River. The topography of the subbasin is comprised primarily of the gentle flatlands of the Sacramento River Valley. The only prominent topographic feature near the subbasin is the Sutter Buttes at its northern boundary, a Pliocene volcanic plug which rises abruptly 2,000 feet above the surrounding valley floor.

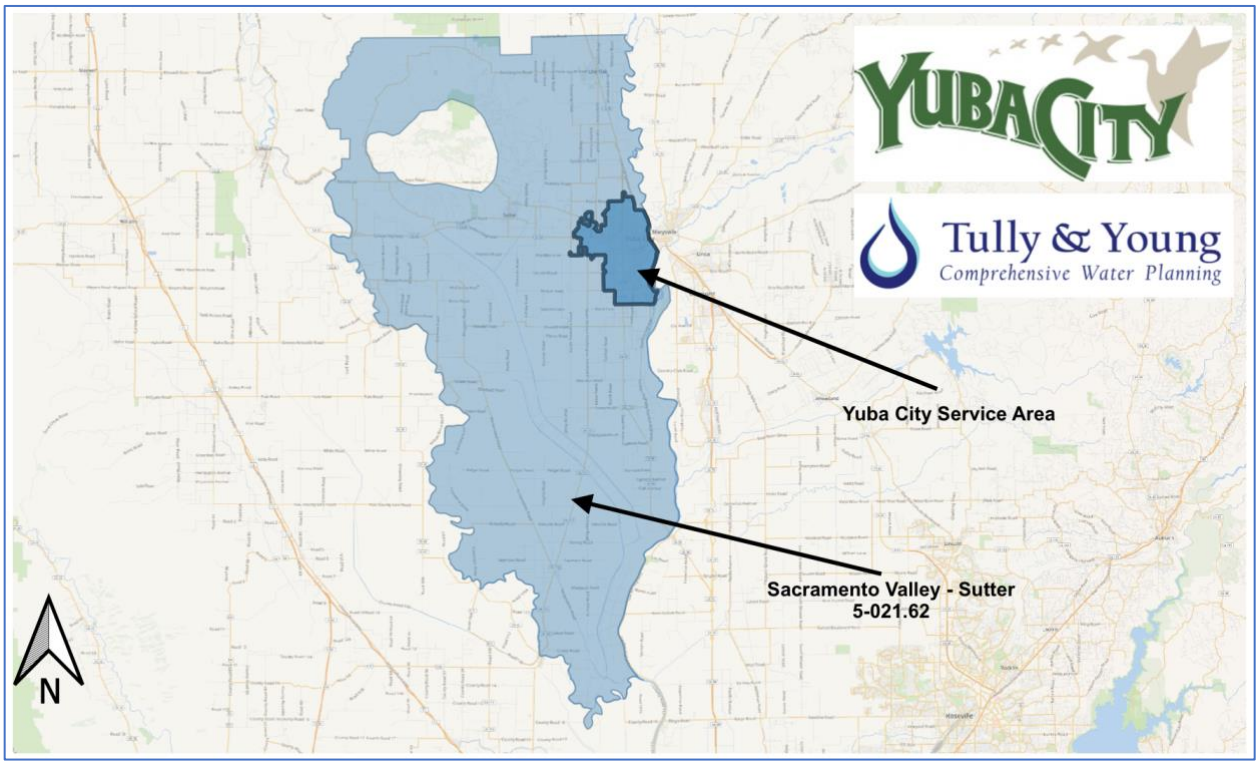
The geologic formations of the Sutter Subbasin include pre-Cretaceous metamorphic and igneous rocks of the Sierra Nevada block, which extends beneath the valley fill overlain principally by Tertiary sedimentary formations derived from these and other rocks which are exposed in the Sierra Nevada to the east. The sedimentary rocks are of both marine and continental origin and are frequently interbedded with tuff-breccias. Volcanic rocks are also represented in the area in and around Sutter Buttes, which are erosional remnants of an extinct Pliocene volcano. Only the sedimentary rocks can be considered as being water bearing to any appreciable degree. The Sutter Subbasin aquifer system is comprised of continental deposits of Quaternary (Recent) to Late Tertiary (Miocene) age. The cumulative thickness of these deposits increases from a few hundred feet near the Sierra Nevada foothills on the east to over 2,000 feet along the western margin of the basin (DWR 1978). Groundwater and geology information for this aquifer system was referenced from Olmsted and Davis 1961, DWR 1978, Page 1986, and B-E 1992.

Holocene Stream Channel and Floodplain Deposits. These alluvial materials occur as coarse sand and gravel along present stream channels of the Yuba, Feather, and Sacramento Rivers. Coarser grained materials occur near streams with thicknesses up to about 100 feet. Both grain size and thickness decrease with increased distance from streams. These deposits are highly permeable and provide for

[34] https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_021_62_SutterSubbasin.pdf

large amounts of groundwater recharge within the subbasin. Well yields are reported in the range of 2,000 to 4,000 gpm. The Sutter Subbasin and Yuba City's service area are shown below in Figure 3-2.

Figure 3-2: Yuba City's Service Area in Sutter Subbasin



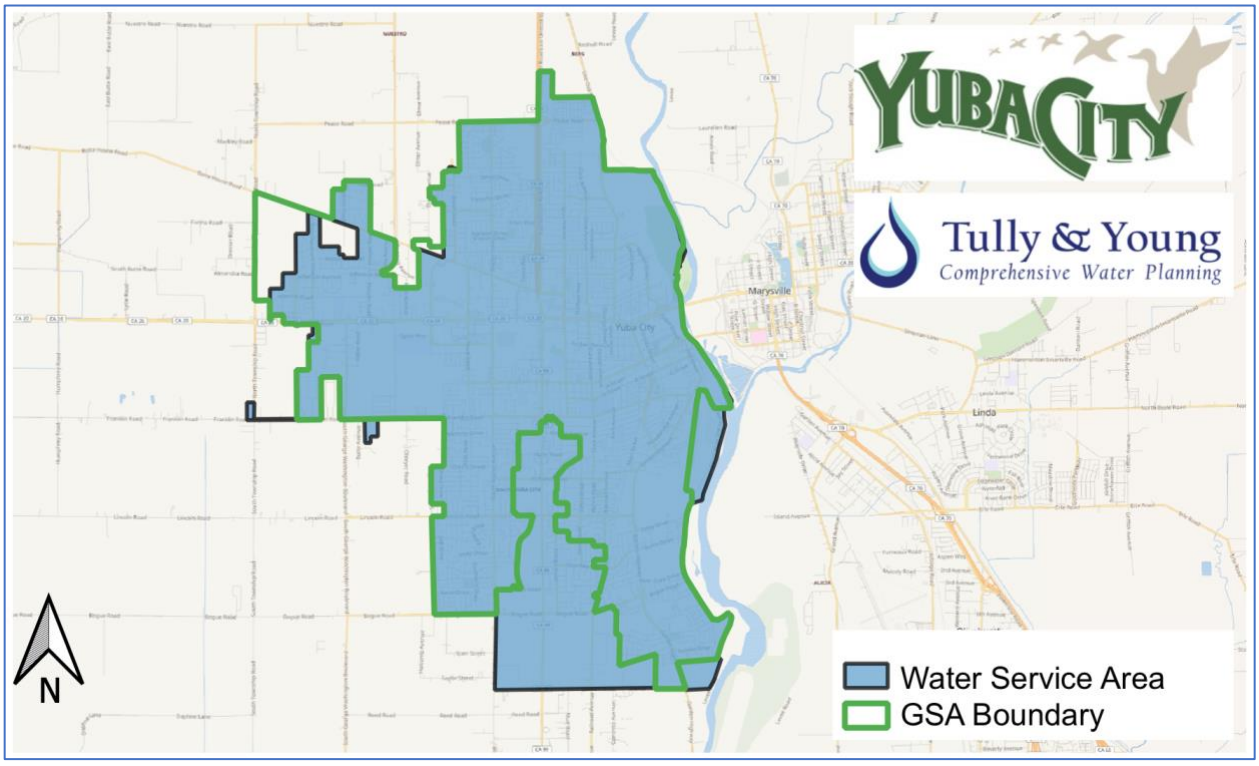
Review of hydrographs in the area of Yuba City show that groundwater levels are stable and have generally increased since the 1970s.[35]

3.2.2 Groundwater Basin Management by the City of Yuba City

On March 21, 2017 the City of Yuba City adopted a resolution to become a GSA. This GSA submitted a GSA boundary based on the City limits from 2017. Since that time, the City's water service boundary has expanded as new projects are developed and lands holding those projects are annexed into the City. Figure 3-3 shows the GSA boundary submitted to DWR compared to the City's Water Service Area. The City's Sphere of Influence areas that are outside of the City's GSA boundary are included in the Sutter County GSA.

[35] Groundwater Levels for Well No's 391370N1216371W001 and 391512N1216190W001

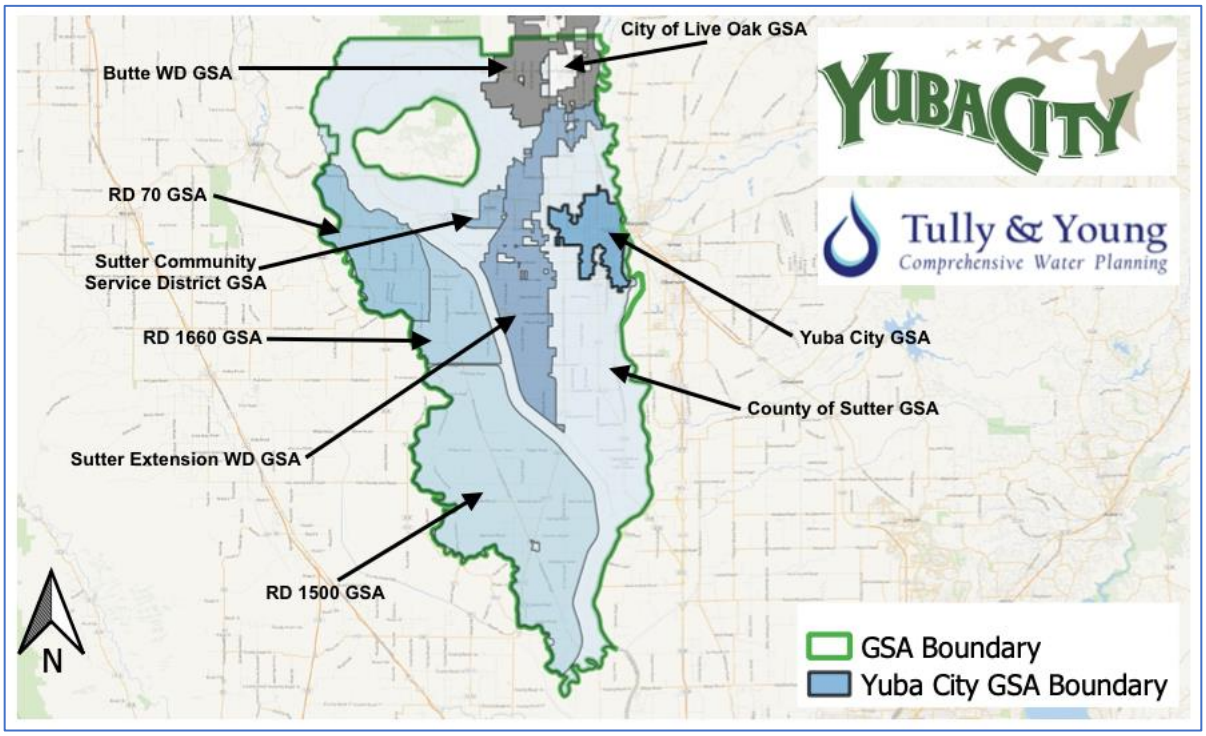
Figure 3-3: City of Yuba City GSA



There are eight (8) other GSA's that overlie the Sutter Subbasin besides the City of Yuba City's GSA. All of the GSA's will prepare a single GSP for the Sutter Subbasin that will address SGMA's sustainability objectives.[36] The Sutter Subbasin GSP process targeted July 31, 2021 to calibrate the model, establish a water budget, develop sustainable management criteria, and propose projects and management actions. As a medium priority basin, this GSP must be finalized by January 31, 2022. Figure 3-4 shows the jurisdictional boundaries of all nine (9) GSA's in the Sutter Subbasin.

[36] http://suttersubbasin.org/

Figure 3-4: All GSA Boundaries in Sutter Subbasin



3.2.3 City's Groundwater Use

The City's Water supply portfolio primarily consists of surface water assets but the City also has groundwater supplies that augment its supply portfolio. Specifically, the City has one well located at its treatment plant that provides raw water into the City's delivery system. Moreover, the City has other groundwater wells dispersed throughout the City's boundaries that provide irrigation water that is disconnected from the City's potable water system.

Yuba City's historical pumping numbers since 2010 at its groundwater well located at the treatment plant are depicted in Table 3-18. Yuba City will continue to protect and secure the groundwater supplies as it implements its conjunctive use program in accordance with its SGMA activities. These efforts may include, as noted in Section 3.5, additional groundwater systems – like Aquifer Storage and Recovery – that would enhance the City's water supply portfolio.

Table 3-18: Last 10 Years of Groundwater Use (AFY)

Year	Groundwater Use
2010	898
2011	0
2012	0
2013	0
2014	2,071
2015	1,134
2016	414
2017	0
2018	0
2019	0
2020	0

The City anticipates the following Groundwater supply for normal, single dry, and five consecutive dry years through 2025 in Table 3-19 and through 2045 as shown in Table 3-20.

Table 3-19: Groundwater Supply in Varying Year Types (AFY)

Year Type		Amount
Normal		2,400
Single Dry Year		2,400
Multi-Year Drought	2021	2,400
	2022	2,400
	2023	2,400
	2024	2,400
	2025	2,400

Table 3-20: Future Projected Groundwater Supply Availability Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		2,400	2,400	2,400	2,400	2,400
Single Dry Year		2,400	2,400	2,400	2,400	2,400
Multi-Year Drought	Year 1	2,400	2,400	2,400	2,400	2,400
	Year 2	2,400	2,400	2,400	2,400	2,400
	Year 3	2,400	2,400	2,400	2,400	2,400
	Year 4	2,400	2,400	2,400	2,400	2,400
	Year 5	2,400	2,400	2,400	2,400	2,400

3.3 Transfers and Exchanges

The City may engage in water transfers and exchanges in order to best support its supply reliability objectives. Most of the City's water assets could be made available for transfer or exchange. For instance, the City's SWP Table A supplies could be delivered to other SWP contractors per the transfer and exchange protocols established by the California Department of Water Resources. The City's appropriative water rights may also be transferred pursuant to the rules established in the California Water Code and implemented by the State Water Resources Control Board. Accordingly, the City may engage in water transfers and exchanges in the future to deliver supplies derived from the City's water assets to other water users.

The City may also acquire water supplies through transfers and exchanges. For example, the City may find itself purchasing SWP Table A supplies from other contractors if it desires to augment its Table A supplies in the future. Nevertheless, the City does not account for any transfers or exchanges as part of its water supply portfolio contemplated in this Chapter.

3.4 Water Quality

The drinking water quality of the Yuba City System must comply with the Safe Drinking Water Act (SDWA), which is composed of primary and secondary drinking water standards. Compliance with primary drinking water standards is regulated by the U.S. Environmental Protection Agency (EPA). Compliance with both primary and secondary standards is required by the State Water Resources Control Board, Division of Drinking Water (DDW).

Yuba City continually monitors the water quality within its Water Service Area system and samples water at the sources as well as within the distribution system to ensure compliance with regulatory standards. Yuba City treats the water derived from the contracted supplies and groundwater systems with appropriate treatment actions that meet all state and federal guidelines. Table 3-21 below shows the most recent water quality report issued by Yuba City for the Water Service Area demonstrating compliance with water quality regulatory standards.

Issues with Groundwater quality were the reason for the City expanding its water treatment plant and transitioning away from significant groundwater use. Current groundwater is pumped from a well near the treatment plant and plumbed in upstream of the treatment system. As such, any groundwater use water quality considerations are captured in the table below.

Table 3-21: Yuba City Water Quality

Water Quality Standards	Goal Level	Max Level	Range	Average
Primary Standards				
Perchlorate (ppb)	1	6	ND	ND
Disinfection Byproduct Precursor (ppm)	NA	TOC>2	1.2-1.6	1.4
Lead (ppb)	0.2	15	ND-34	1.6
Copper (ppb)	0.3	1.3	ND-2500	36.1
Flouride (ppm)	1	2	.5-.8	0.7
Chlorine (ppm)	2	4	1.3-1.6	1.4
Nitrate (ppm)	10	10	ND	ND
Secondary Standards				
TDS (ppm)	n/a	1000	34-100	75
Manganese (ppb)	n/a	50	.7-1.1	0.9
E.C. (µs/cm)	n/a	1600	120-160	138
Odor (units)	n/a	3	ND-2	1
Additional Constituents Analyzed				
Trihalomethanes (ppb)	n/a	80	28-62	46
Haloacetic Acids (ppb)	n/a	60	12-32	21
Total Coliform (units)	0%	<5%	0%	0%
NTU (units)	n/a	n/a	.01-.1	0.03
Sodium (ppm)	n/a	n/a	5	5
Hardness as CaCO3 (ppm)	n/a	n/a	37-67	58
Boron (ppb)	1000	n/a	ND	MD

As shown in the table, Yuba City meets and exceeds all water quality conditions for its 2020 data collection and assessments.

3.5 Planned Projects

The City has explored the feasibility of developing Aquifer Storage and Recovery (ASR) wells to provide seasonal and long-term underground storage of drinking water. ASR would make efficient use of existing water diversion, treatment, and transmission facilities. ASR is defined as the recharge of water into a well during times when water of suitable quality is available for storage and recovery of water from the same well during times when the water is needed. The City completed an ASR feasibility assessment that concluded that ASR is feasible and recommended that the City should proceed with an ASR demonstration project at the water treatment plant.

In 2012, the SWRCB adopted Water Quality Order (WQO) 2012-0010, General Waste Discharge Requirements for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater (State Board, 2012). WQO 2012-0010 provides a streamlined regulatory process for projects, such as

the City's planned ASR project. In 2015, the City completed construction of three multiple-completion groundwater monitoring wells at the WTP site for the purpose of more fully characterizing the hydrogeology of the site and to assess groundwater flow gradients and groundwater quality in the two targeted aquifer zones. The planned project would consist of construction of one or two municipal wells at the WTP site. These wells would be screened in the upper and lower aquifer zones respectively. Alternatively, the existing municipal well at the WTP could be modified to enable injection and extraction from the lower aquifer zone. The wells would be used to inject treated surface water sourced from the WTP into the two aquifer zones during the late fall, winter and early spring, when demands are typically lower and surface water supplies are plentiful, and recovery of the treated surface water during the summer and early fall when demands are higher and surface water supplies are limited. Water recovered from the wells would be blended with treated surface water at the WTP.

3.6 Desalination

Desalination of ocean water is not physically or financially viable for the City at this time and it has no future plans to develop water supplies derived from desalination activities.

3.7 Recycled Water Supplies

The Yuba City Wastewater Treatment Facility (WWTF), originally built in 1975, was redesigned in 2003 to treat an average flow of 10.5 million gallons per day (MGD) with an average organic loading of 44,000 lbs/day biological oxygen demand (BOD) and 16,000 lbs/day total suspended solids (TSS). Yuba City's current average daily flow is about 6.5 MGD. The redesign of the facility will enable Yuba City to provide wastewater treatment for projected growth over the next ten years. It is a Class IV Wastewater Treatment Facility with a pure oxygen activated sludge process designed to handle high and variable BOD loads from local food processing facilities, commercial facilities and residential areas. The facility consists of three main treatment processes – Primary Treatment, Secondary Treatment and Bio-solids Treatment. Primary Treatment consists of bar screens to remove large objects such as plastics, metals, rags, and paper from the influent wastewater, an aerated grit chamber to remove grit (sand, cinder, bone chips, seeds, coffee grounds, eggshells etc.) from the influent wastewater flow, and primary clarifiers to remove approximately 26% to 30% of the Biochemical Oxygen Demand (BOD) and 60% to 70% of the total suspended solids (TSS). Secondary Treatment consists of a High Purity Oxygen (HPO) activated sludge process to remove the remaining BOD through the biological process and secondary clarifiers to allow the bacteria used in the process to be recycled within the facility. Secondary effluent is disinfected with chlorine followed by de-chlorination and then discharged into the Feather River or percolation ponds located on the east side of the Feather River in the river flood plain. [37]

The City uses only a limited amount of recycled water for plant processes and irrigation at the WWTF. The total recycled water use is shown in Table 3-22 below.

[37] https://www.yubacity.net/city_hall/departments/public_works/utilities/wastewater/plant_operations

Table 3-22: Last Five Years of Recycled Water Use (AFY) (need data)

Year	Recycled Water Use
2016	585
2017	833
2018	760
2019	747
2020	530

The City anticipates limited growth in its recycled water uses over time. Although it is coordinating with regional agencies about potential recycled water supply development, the actions are limited at this time. Table 3-23 shows the projected recycled water use through 2025 and Table 3-24 shows the projected recycled water availability through 2045. In all instances, the City intends to continue recycled water use at the WWTF consistent with past practices. This supply is not counted towards the City's future potable supply assessment.

Table 3-23: Projected Recycled Water Supply Through 2025 (AFY)

Year Type		Amount
Normal		650
Single Dry Year		650
Multi-Year Drought	2021	650
	2022	650
	2023	650
	2024	650
	2025	650

Table 3-24: Projected Recycled Water Supply Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		650	650	650	650	650
Single Dry Year		650	650	650	650	650
Multi-Year Drought	Year 1	650	650	650	650	650
	Year 2	650	650	650	650	650
	Year 3	650	650	650	650	650
	Year 4	650	650	650	650	650
	Year 5	650	650	650	650	650

3.8 Supply Summary

The City's four surface water supplies are: (1) State Water Project contract; (2) State Water Resources Control Board water right license; (3) State Water Resources Control Board water right permit; and (4) contract with North Yuba Water District. All of these supplies are available in normal, single dry, and five consecutive dry years through the 25-year planning horizon in this 2020 UWMP. Table 3-25 summarizes the supplies available from 2021 through 2025. Tables 3-26 through 3-31 show the individual tables for each water asset held by the City on a monthly timestep from 2021 through 2025. All six of these tables represent managed actions for each water asset to demonstrate sufficient monthly supplies to meet demands.

Table 3-25: Potable Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		2,247	2,519	2,519	2,700	3,011	2,287	1,938	1,938	2,108	2,895	2,519	2,247	28,928
Single Dry Year		2,419	2,294	2,419	2,378	1,498	1,747	1,953	1,851	1,620	1,463	2,378	2,419	24,439
Multi-Year Drought	2021	2,141	2,016	2,141	2,281	1,528	1,923	1,984	1,934	1,744	1,488	2,280	2,321	23,781
	2022	2,141	2,016	2,141	1,031	1,528	1,943	1,982	1,912	1,684	1,578	2,100	2,141	22,198
	2023	2,419	2,294	2,419	1,128	1,528	1,777	1,983	1,907	1,658	1,485	2,378	2,419	23,396
	2024	2,141	2,016	2,141	1,031	1,528	1,778	1,986	1,907	1,659	1,485	2,100	2,141	21,914
	2025	2,141	2,016	2,141	2,281	1,528	1,777	1,983	1,907	1,684	1,486	2,160	2,141	23,245

Table 3-26: Table A Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		0	272	272	272	272	272	544	544	272	272	272	0	3,264
Single Dry Year		0	0	0	0	0	120	40	20	20	20	20	0	240
Multi-Year Drought	2021	0	0	0	0	180	180	540	540	180	180	180	180	2,160
	2022	0	0	0	0	0	120	580	520	120	100	0	0	1,440
	2023	0	0	0	0	0	120	20	20	20	60	0	0	240
	2024	0	0	0	0	100	0	260	170	10	180	0	0	720
	2025	0	0	0	0	120	0	720	360	120	120	0	0	1,440

Table 3-27: Table A Carryover Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		272	272	272	272	272	272	272	272	272	272	272	272	3,264
Single Dry Year		0	0	0	0	0	357	764	679	647	817	0	0	3,264
Multi-Year Drought	2021	0	0	0	0	56	0	272	272	0	82	0	0	682
	2022	0	0	0	0	186	80	280	270	0	252	0	0	1,068
	2023	0	0	0	0	197	203	732	765	724	849	0	0	3,470
	2024	0	0	0	0	86	35	604	615	85	79	0	0	1,504
	2025	0	0	0	0	66	34	141	425	0	140	60	0	866

Table 3-28: License 13855 Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		650	650	650	650	650	650	0	0	650	650	650	650	6,500
Single Dry Year		928	928	928	928	928	0	0	0	0	0	928	928	6,500
Multi-Year Drought	2021	650	650	650	650	650	650	0	0	650	650	650	650	6,500
	2022	650	650	650	650	650	650	0	0	650	650	650	650	6,500
	2023	928	928	928	928	928	0	0	0	0	0	928	928	6,500
	2024	650	650	650	650	650	650	0	0	650	650	650	650	6,500
	2025	650	650	650	650	650	650	0	0	650	650	650	650	6,500

Table 3-29: Permit 18558 Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		1,125	1,125	1,125	1,125	1,125	0	0	0	0	1,125	1,125	1,125	9,000
Single Dry Year		1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291	7,539
Multi-Year Drought	2021	1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291	7,539
	2022	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291	6,290
	2023	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291	6,290
	2024	1,291	1,166	1,291	0	0	0	0	0	0	0	1,250	1,291	6,290
	2025	1,291	1,166	1,291	1,250	0	0	0	0	0	0	1,250	1,291	7,539

Table 3-30: North Yuba Water District Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		0	0	0	181	492	893	922	922	714	376	0	0	4,500
Single Dry Year		0	0	0	0	370	1,070	949	952	753	406	0	0	4,500
Multi-Year Drought	2021	0	0	0	181	492	893	922	922	714	376	0	0	4,500
	2022	0	0	0	181	492	893	922	922	714	376	0	0	4,500
	2023	0	0	0	0	203	1,254	1,031	922	714	376	0	0	4,500
	2024	0	0	0	181	492	893	922	922	714	376	0	0	4,500
	2025	0	0	0	181	492	893	922	922	714	376	0	0	4,500

Table 3-31: Groundwater Supply Availability in Varying Year Types Through 2025 (AFY)

Year Type		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal		200	200	200	200	200	200	200	200	200	200	200	200	2,400
Single Dry Year		200	200	200	200	200	200	200	200	200	200	200	200	2,400
Multi-Year Drought	2021	200	200	200	200	200	200	200	200	200	200	200	200	2,400
	2022	200	200	200	200	200	200	200	200	200	200	200	200	2,400
	2023	200	200	200	200	200	200	200	200	200	200	200	200	2,400
	2024	200	200	200	200	200	200	200	200	200	200	200	200	2,400
	2025	200	200	200	200	200	200	200	200	200	200	200	200	2,400

Table 3-32 depicts the annual supplies available through 2045. The monthly timestep for management of these supplies would require similar management actions as shown in the 2021 through 2025 management actions.

Table 3-32: Future Projected Total Potable Supply Availability Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		28,928	28,928	28,928	28,928	28,928
Single Dry Year		24,439	24,439	24,439	24,439	24,439
Multi-Year Drought	Year 1	26,363	26,363	26,363	26,363	26,363
	Year 2	23,290	23,290	23,290	23,290	23,290
	Year 3	21,366	21,366	21,366	21,366	21,366
	Year 4	20,650	20,650	20,650	20,650	20,650
	Year 5	23,099	23,099	23,099	23,099	23,099

Chapter 4
Water Use

Understanding water use characteristics is essential to enable the City to reliably and cost-effectively manage its water supplies to continue to meet customer needs. This section characterizes the City's retail customer demands – current and forecast over the next few decades. Characteristics such as how demands vary among different land use classifications, throughout the year, and under differing hydrologic conditions, all help with that understanding.

A thorough characterization and analysis provides a realistic prediction of future water use based upon the City's past and current water use, in addition to considerations of anticipated growth, new regulations, changing climate conditions and trends in customer water use behaviors. A thorough analysis examines each water use sector for a variety of factors, then aggregates the information into a comprehensive projection of customer water use that becomes the foundation for integration with the City's water supplies (see Chapter 3) to assess long-term water system reliability (see Chapter 5).

Several legislative changes were enacted since the City completed its 2015 UWMP. The new requirements must be addressed in the City's 2020 UWMP in addition to completing requirements from the prior statutory language. While there have been many changes, the critically important items the City must address are highlighted below:

- Provide quantified distribution system losses for each of the 5 preceding years and whether the State standard was met. [CWC 10631(d)(3)(A) and (C)]
- Include a drought risk assessment (DRA) for a drought period that lasts five consecutive water years, starting from the year following the assessment, which would be 2021 for this round of UWMPs. The DRA requires a comparison of water supplies with total projected water use. Therefore, the City must produce a projected water use for the years 2021 through 2025 as part of the water use projections up to 2045. [CWC 10635(b)]
- Conduct an annual water supply and demand assessment on or before July 1 of each year (following adoption of its 2020 UWMP) where the annual assessment includes current year unconstrained demand. The City will consider "unconstrained demand" as the expected water use in the upcoming year, based on recent water use, before any projected response actions it may trigger under its Water Shortage Contingency Plan (see Chapter 6). [CWC 10632.1]

This section is organized as follows:

- Current Customer Water Use – This subsection presents data reflecting the City's residential and non-residential customers for 2016 through 2019 as well as the actual 2020 water use and presents the City's distribution system losses for this same period.

- Compliance with 2020 Urban Water Use Target – This subsection documents the derivation of the 2020 GPCD value and comparison to the 2020 GPCD target.
- Demand Management Measures – This subsection provides a narrative description of each water demand management measure implemented by the City over the past five years, and describes the City's planned measures for the foreseeable future.
- Forecasting Customer Use – This subsection presents the derivation and results of future water use forecasts for potable water within the City's service area, including land-use classifications, unit demand factors, and estimation of distribution system losses. This subsection also estimates the variations in customer water use the City should expect during years with low rainfall as well as discusses longer-term climate change considerations.
- Forecasting Water Use for DRA and Annual Assessment – This subsection focuses on the subset of the customer water use forecast that is necessary for completing the 5-year Drought Risk Assessment (DRA) and defining the "unconstrained demand" for purposes of the City's annual water supply and demand assessment.
- Projecting Disadvantaged Community Water Use – This subsection presents the estimated water use necessary to meet lower income households, pursuant to California Water Code 10631.1.

4.1 Current Customer Water Use

As described in Chapter 2, the City has been serving potable water to over 18,000 customer connections for the past several years. Under normal operations, all of the water supplied by the City to its customers is drawn from the Feather River, treated at the City's water treatment plant, and delivered through an array of pipelines and turnouts (see Figure 2-7). The current customers, their recent and expected water use trends, and the City's on-going demand management efforts targeting these customers provide a foundational basis for this UWMP's water use forecast to 2045.

Furthermore, the actual water use in 2020 is the basis for determining the City's compliance with its 2020 gallons per capita per day (GPCD) target established in its 2015 UWMP. This subsection presents this relevant information.

4.1.1 Customer Water Use: 2016 to 2019

Recent customer water use can help the City understand water use trends, effects of temporary use restrictions imposed during the most recent prolonged drought and recovery from such temporary restrictions, effects of long-term demand management measures, and other pertinent water use factors relevant to its forecast of future water use. Water Code Section 10631(d)(1) also requires the City to quantify past customer water use.[38]

Table 4-1 presents the City's past customer water use by customer classification for 2016 through 2019. The City records water use within five primary categories:

- Single-family residential
- Multi-family residential

[38] California Water Code Section 10631(d)(1)

- Commercial and Institutional
- Industrial
- Landscape Irrigation

The City also records a small quantity of water under "other" which captures a range of small, non-standard uses such as hydrant flushing.

Notably, the City's water service under each customer classification has remained fairly consistent over period, fluctuating slightly to reflect normal hydrologic variances.

Table 4-1: Customer Use: 2016 to 2019 (values in acre-feet)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-Family Residential	2016	286	285	305	468	617	796	919	886	768	527	337	292	6,487
	2017	294	247	332	375	766	869	1,030	963	816	689	369	346	7,097
	2018	300	336	336	459	713	910	991	894	789	654	507	305	7,193
	2019	339	257	301	437	613	796	978	943	775	666	534	326	6,965
Multi-Family Residential	2016	111	103	110	123	137	152	173	170	153	136	111	105	1,583
	2017	113	91	108	110	148	160	181	179	157	149	114	109	1,619
	2018	107	100	109	114	139	164	175	169	155	144	128	106	1,609
	2019	115	91	103	112	139	146	174	173	155	144	128	108	1,588
Commercial Institutional	2016	99	99	103	122	140	150	162	170	154	132	103	97	1,532
	2017	101	82	104	109	151	157	171	175	162	152	108	102	1,575
	2018	100	102	172	119	142	169	176	171	157	145	124	101	1,678
	2019	114	88	100	115	144	150	170	174	157	152	128	100	1,593
Industrial	2016	132	126	145	153	156	171	164	180	160	164	135	104	1,790
	2017	150	126	164	145	170	179	175	187	175	180	148	118	1,918
	2018	147	150	149	162	173	154	181	198	140	170	87	36	1,748
	2019	163	111	155	148	168	96	71	73	93	100	78	62	1,318
Landscape Irrigation	2016	13	12	15	49	69	98	122	128	116	72	34	19	748
	2017	15	12	25	37	109	199	139	137	124	108	35	25	965
	2018	19	28	25	39	93	128	149	139	124	98	74	26	942
	2019	24	14	16	41	91	103	137	139	114	109	79	30	896
Total Metered Deliveries	2016	641	625	679	915	1,119	1,367	1,541	1,533	1,351	1,032	721	617	12,141
	2017	672	558	733	777	1,344	1,565	1,696	1,641	1,435	1,278	775	700	13,174
	2018	673	715	790	894	1,259	1,525	1,671	1,571	1,365	1,211	919	575	13,170
	2019	754	561	675	854	1,155	1,291	1,531	1,501	1,295	1,170	948	625	12,359

This historic data also provides insight into the relative ratio of differing customer classifications to each other as well as seasonal variations. For instance, industrial demands remain fairly constant month to month and generally year to year. In contrast, landscape irrigation is significantly higher in the summer months compared to the winter, when generally rainfall is sufficient to meet the water needs of large landscapes (e.g. parks and play fields).

The single-family residential classification illustrates three important characteristics of the City's water service: (1) it represents over 50% of the City's annual demand, (2) it has summer demands that are three times the monthly volume needed in winter months, and (3) summer demands are as much as 60% of the City's water needs, while winter drops to around 45%. Combined with the multi-family residential use, overall residential use represents 65% to 70% of the City's water service.

These seasonal variations and dominance as the highest water using classification provide the City with additional insight necessary for assessing the seasonal reliability of its water supplies and developing and quantifying successful water shortage contingency response actions.

4.1.2 Customer Use in 2020

Customers served by the City are metered at their connection to the City's distribution system. These metered values are collected periodically for each customer account and summarized into the City's annual reporting to the SWRCB Division of Drinking Water and to DWR.[39] The 2020 actual customer use presented in Table 4-2 represents the summarized delivery to all the City's customers. It does not, however, include the distribution system losses inherent in a pressurized water delivery system that occur during the City's efforts to treat, store and route the water throughout the extensive distribution system to each customer's connection.

Further, comparing to the total values in Table 4-1, the 2020 annual customer use of nearly 13,000 acre-feet is slightly greater than 2019, but slightly less than both 2017 and 2018. However, comparing the specific customer classifications, the 2020 data displays two unique circumstances: (1) single-family residential use is about 900 acre-feet higher than the average over the last 4 years – or about 13% higher, and (2) the industrial use is nearly 60% lower. The other classifications are within the variations for each over the past several years.

Table 4-2: Customer Water Use: 2020 Actual Use (values in acre-feet)

Use Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-family Residential	322	388	462	615	749	913	1,053	1,000	834	745	501	399	7,981
Multi-family Residential	111	104	120	136	144	159	182	178	158	147	118	120	1,677
Commercial/ Institutional	105	100	109	106	127	146	164	159	148	146	114	97	1,522
Industrial	94	74	55	15	36	51	50	67	49	81	96	78	746
Landscape Irrigation	21	30	70	65	89	109	134	131	110	111	63	38	972
Other	0	0	0	0	0	2	2	1	1	1	1	0	10
Subtotal	653	697	816	937	1,146	1,381	1,585	1,537	1,301	1,232	892	733	12,909

[39] The annual SWRCB report is referred to as the 'electronic Annual Report' or eAR, and the annual DWR report is known as the Public Water System Statistics report.

The significantly higher single-family residential use and lower industrial use nearly offset each other, resulting in an overall total use that is consistent with prior years. The higher-than-average single-family residential use is likely due to the pandemic that dominated 2020 and the multiple advisories and even government-imposed restrictions that resulted in many people working from, learning from, or simply staying at home.

4.1.3 Existing Distribution System Losses

Distribution system water losses (also known as "real losses") are the physical water losses from the City's water distribution system up to the point of delivery to the customer's system (e.g. up to the residential water meter).

Since 2016, the City has been required to quantify its distribution system losses using the American Water Works Association Method (Title 23 California Code of Regulations Section 638.1 et seq.). An electronic copy of the audit in Excel format is to be submitted to the Department by October 1 of each year for the prior year's estimated system losses, using DWR's online submittal tool pursuant to Code of Regulations Section 638.5. Pertinent results are shown in Table 4-3. The 2020 estimate has not been officially submitted to DWR as of the drafting of this UWMP but is estimated to be approximately 1,200 acre-feet over the year, or about 8.4% of the water entering the City's distribution system.

Table 4-3: Distribution System Loss: 2016 through 2020

2016	2017	2018	2019	2020
7.1%	6.6%	6.4%	6.4%	8.4%
			Average excluding 2020 =	6.6%
			Average including 2020 =	7.0%

As can be anticipated given the dynamic functions of a pressurized potable water distribution system, the estimated annual distribution system loss as a percentage of water entering the system will vary year-to-year and month to month. On average, however, the City's distribution system loss represents about 6.6% of the water entering the City's distribution system. The higher-than-average value for 2020 is likely a result of the higher residential customer use as described previously. The increased delivery through the significant portion of the City's distribution system serving residential customers likely resulted in greater loss – though occurring at the same rate per gallon delivered. Since the effects of the 2020 pandemic upon the general water use characteristics of the City's customers are not expected to continue over the UWMP planning horizon, the average distribution system loss percentage excluding 2020 will be used for purposes of water use forecasting.

4.1.4 Water Treatment Plant Process Water

As part of the City's water treatment processes, additional water is diverted from the river but not included as part of the City's production values. This water accounts for water used in filter backflushing and other treatment process steps. The City is evaluating opportunities to recirculate this water back into the beginning of the treatment process consistent with some advanced water treatment best management practices, but does not have any plans in place for this action as of the preparation of this

2020 UWMP. Therefore, the total quantity diverted from the river and pumped from the ground includes water necessary for the water treatment processes. The historic process water is shown in Table 4-4, and represents about 5% added to the metered customer deliveries and the distribution system losses.

Table 4-4: Historic Water Treatment Plant Process Water (acre-feet)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	Inflow	804	759	847	1,041	1,252	1,494	1,691	1,688	1,502	1,158	802	734	13,772
	Production	715	695	770	1,002	1,217	1,451	1,519	1,618	1,405	1,101	770	699	12,960
	Diff (af)	89	64	77	40	36	43	172	70	96	57	32	35	811
	Diff (%)	89%	92%	91%	96%	97%	97%	90%	96%	94%	95%	96%	95%	94%
2017	Inflow	751	633	794	857	1,469	1,604	1,811	1,780	1,576	1,399	851	841	14,366
	Production	721	609	807	844	1,439	1,576	1,793	1,770	1,561	1,360	838	786	14,105
	Diff (af)	30	24	-12	13	30	28	18	10	16	39	13	54	261
	Diff (%)	96%	96%	102%	99%	98%	98%	99%	99%	99%	97%	98%	94%	98%
2018	Inflow	758	880	836	975	1,417	1,649	1,845	1,715	1,503	1,334	1,077	792	14,780
	Production	729	770	793	922	1,366	1,561	1,726	1,658	1,464	1,285	1,040	753	14,067
	Diff (af)	29	110	43	53	51	88	119	56	39	49	37	39	713
	Diff (%)	96%	88%	95%	95%	96%	95%	94%	97%	97%	96%	97%	95%	95%
2019	Inflow	794	693	790	929	1,266	1,529	1,753	1,747	1,459	1,322	1,055	759	14,095
	Production	713	640	726	863	1,172	1,443	1,637	1,633	1,387	1,269	994	735	13,211
	Diff (af)	81	53	64	66	94	86	116	114	72	53	61	24	883
	Diff (%)	90%	92%	92%	93%	93%	94%	93%	93%	95%	96%	94%	97%	94%
2020	Inflow	751	843	985	1,076	1,402	1,642	1,841	1,815	1,544	1,464	1,035	875	15,274
	Production	689	782	906	985	1,301	1,525	1,689	1,682	1,444	1,360	950	785	14,099
	Diff (af)	62	61	79	91	101	117	152	133	100	104	85	89	1,175
	Diff (%)	92%	93%	92%	92%	93%	93%	92%	93%	94%	93%	92%	90%	92%

4.2 Compliance with 2020 Urban Water Use Target

Pursuant to California Water Code Section 10608.24(b)[40], the City must demonstrate its 2020 water use met the GPCD target adopted in its 2015 UWMP. As set forth in the 2015 UWMP, the City's 2020 GPCD target was established as 192 GPCD, derived as the "gross water use" divided by the population during a defined baseline period, and reduced pursuant to one of four methods defined under California Water Code Section 10608.20(b). The City's 2020 actual GPCD must use the same methodology to derive "gross water use" for 2020, then divide by the estimated 2020 population presented in Chapter 2.

As presented in the City's 2015 UWMP, gross water was determined to be the total water entering the City's water treatment plant. This value corresponds to the total "Potable Water" for 2020 as recorded by the City on it 2020 Water Systems Statistics Report, which was 4,594.15 million gallons – or 14,099 acre-feet. This value represents both the customer deliveries shown in Table 4-2 and the distribution

[40] 10608.24. (b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

system losses recorded in Table 4-3. As shown in Table 2-4, the City's population in 2020 was estimated to be 70,458. This results in a calculated 2020 compliance value of 179 GPCD, which is less than the City's established target. Thus, the City is in compliance with CWC Section 10608.24(b). The important compliance calculation parameters are summarized in Table 4-5.

Table 4-5: Demonstration of Compliance with 2020 GPCD Target

2020 Volume into Distribution System =	14,099	acre-feet
Allowable Adjustments	0	acre-feet
2020 Gross Water Use =	14,099	acre-feet
2020 Population =	70,458	people
2020 Actual GPCD =	179	
2020 Target GPCD =	192	
Compliance Achieved?	Yes	

4.3 Demand Management Measures

Pursuant to California Water Code Section 10631(e), the City needs to provide a narrative discussion of the water demand management measures it has implemented, is currently implementing, and plans to implement. The historic and on-going measures can help the City understand the effectiveness on managing existing customer uses so as to help guide refinements, emphasis or augmentation that will help position the City to best meet its undefined, to-be-established water use objective.[41]

To date, the City's overall water management efforts have resulted in significant and long-term water conservation savings. During the 2013 to 2015 drought, the City's residents showed great ability to temporarily reduce water usage and many of the efforts have had long-term viability, providing on-going savings well into the future. The City is also a member of the Regional Water Authority (RWA) which has a Water Efficiency Partnership (WEP). Even though the City does not participate in the WEP, the City's customers benefit from the outreach programs implemented by the WEP.

The City's demand management measures are highlighted in this subsection.

4.3.1 Foundational Demand Management Measures

This subsection describes the foundational demand management measures (DMMs) that underpin the City's operations and customer deliveries. These particular DMMs represent adopted ordinances, policies, and long-standing budgeted conservation programs.

[41] Beginning in 2023, all urban water suppliers will be required to begin reporting their use compared to a "Water Use Objective" that is being established pursuant to the recently enacted California Water Code Section 10609.20.

Water Waste Prevention Ordinances

Wasteful water use is prohibited in the City's service area as recognized in Sec. 6-6.08.(b) Water Waste of City ordinance. No customer shall permit leaks or the waste of water. When water is wastefully or negligently used on a customer's premises, the City may discontinue the service if such conditions are not corrected.

Furthermore, Sec. 6-6.19. recognizes emergency water restrictions and dictates the regulations in the Water Shortage Contingency Plan will apply during upon declaration from the City Council that water supply conditions justify implementation of emergency restrictions. These fundamental prohibitions align with state-mandated requirements. The ordinance prohibits all users from unreasonable waste and includes graduated penalties for waste and/or unreasonable use during all stage declarations. For all conditions, including Normal Water Supply, restrictions on water waste include:

- Runoff prohibited.
- Watering after rainfall event prohibited.
- Automatic shutoff nozzles are required for all hoses.
- Washing driveways and other paved areas is prohibited.
- Pools, ponds, and fountains are required to use recirculated water.

In addition, the City has "yc311", an online service and mobile app which allows anyone to report water waste, facilitating proactive response and improved management.[42]

The City has implemented this DMM over the planning period (through multiple versions of the WSCP) and will continue to actively manage water waste through 2045.

Metering

All water service connections in the City's service area are metered. The City began using radio-read customer meters in 2010, and began transitioning to automated metering infrastructure (AMI) in 2017 to provide more timely information to customers and for the City's management needs. AMI meters have been shown to reduce exterior landscape use and modest reductions in interior water use. The City currently has 14,400 AMI meters install, covering about 75% of customer connections, with 100% coverage expected by the end of 2021.

Conservation Pricing

The City's water rate structure is set to generate the necessary funds to efficiently operate the City's water system and maintain reliable water supplies. The City uses a single-tier pricing structure based on water use and meter size. The rate structure includes a baseline allocation rate, and per HCF charge above baseline component. Under normal water supply conditions, this rate structure has effectively reduced customer water use. The City also can assess surcharges for violations of water use restrictions according to City ordinance 6-6.20.

[42] https://www.yubacity.net/online_services/yc311

Public Education and Outreach

The City regularly engages its customer base with a number of conservation and demand management outreach programs. Promoting water-wise activities, watering schedules, and educational programs are part of the City's regular outreach efforts, which include an efficiency web page providing resources to the community for conserving water.[43]

In addition to local public education and outreach programs, the City also participates in a regional public education and outreach program through the Regional Water Authority. The Regional Water Authority (RWA) is a joint powers authority formed in 2001 to promote collaboration on water management and water supply reliability programs in the greater Sacramento, Placer, El Dorado, Yolo and Sutter counties. In collaboration with 19 water provider members and other wastewater, stormwater and energy partners, RWA formed the Water Efficiency Program (WEP) in 2001 to bring cost effectiveness through economies of scale to public education and outreach activities. While the City I not an active participant in the WEP, through its membership in RWA, the City's water service customers can access the WEP materials through RWA.

The WEP operates on an average annual budget of $530,000 and is supplemented by grant funding. Grants are an important funding resource for the Program. Since 2003, the Program has been awarded $13.2 million in grant funding for public outreach and education as well as a variety of rebate programs, fixture direct install programs, system water loss, individualized customer usage reports, large landscape budgets and more. Of those funds, $3.8 million was awarded between 2016 and 2020.

The main function of the WEP is to develop and distribute public outreach messages to customers in the region by collaborating with its water provider members. The Program distributes these messages on a regional scale through regional media and advertising buys and was honored with the United States Environmental Protection Agency WaterSense Excellence in Education and Outreach Award in 2016. From 2016-2020, the WEP created a series of public outreach campaigns. Below is a summary of each campaign and highlighted achievements.

Following the historic 2015 California drought, the WEP launched the "Rethink Your Yard" Campaign in 2016 with a focus on prioritizing landscape watering, putting trees first and transitioning thirsty lawn and landscaping to beautiful, low water use, River-Friendly landscapes. The Program publicized the campaign through online advertisements, social media, commercial radio, Raley Field (local baseball stadium) and local billboards. The campaign featured local homeowners with their newly redesigned yards on billboards throughout the region.

The campaign launched in 2017 focused on encouraging customers to understand and deliver the amount of water their landscape really needs and to make permanent equipment changes to improve efficiency such as installing weather-based irrigation controllers, more efficient sprinklers and drip irrigation. The Program partnered on this messaging with local nurseries through a "Get Growing this

[43] https://www.yubacity.net/city_hall/departments/public_works/utilities/water/conservation

Fall" initiative to encourage residents to plant in the fall when days are cooler and plants don't need as much water to establish roots.

From 2018 through 2020, the regional campaign focused on tackling the landscape overwatering problem with a "Check and Save" message encouraging residents to check the soil moisture with a moisture meter before turning on sprinklers. To support this message, the Program provided free moisture meters via an online request form and at events. In 2019, WEP distributed 3,000 moisture meters to customers throughout the region.

These campaigns are implemented through both paid advertising buys and earned media from public service announcements (PSAs). Every year the campaigns can be heard on local radio stations such as Capital Public Radio and online through Google, Facebook and YouTube advertisements. From 2016-2020, the WEP public outreach campaigns produced:

- Radio Advertising (2016-2020)
  - 3,443 radio advertisements ran
  - 17.2 million impressions
- Digital Advertising (Facebook, Google Display Network and Spotify) (2016-2020)
  - 24.3 million impressions
  - 262,900 clicks
- Additional advertising (billboards in 2016)
  - 1.8 million digital advertisements ran
  - 51.6 million impressions
- Public Service Announcements (Television and Radio) (2016-2020)
  - 20 million impressions
  - $570,000 in value had they been purchased as advertising

The Program also continues messaging through its own Facebook page. From 2016-2020, the Program created about 60 Facebook posts a year featuring water saving tips and other relevant information. The WEP hosted several Facebook sweepstake contests including: Tree Hugger in 2016, where participants submitted pictures hugging a tree to raise awareness about the importance of healthy trees and the Under/Over Debate in 2020, where participates were asked to weigh in what is the proper way to hang toilet paper to raise awareness of toilet leaks. The winner of the Under/Over Debate sweepstakes received a case of toilet paper delivered via mail and gift card to a local hardware store.

The Program continues to utilize the public outreach website bewatersmart.info to reach customers throughout the region. The website contains regional and local water provider information on rebates and services, top ways to save, an interactive watering and water waste information map, a water-wise gardening database, recent press releases, the Sacramento Smart Irrigation Scheduler tool, and more.

Educational information and customer services were modified to address the COVID-19 pandemic in 2020 including online water efficiency lessons for kids, a list of nurseries that offered curbside pick-up, virtual water wise house calls, and numerous virtual educational customer workshops. Between 2016 and 2020, the website averaged 96,000 unique visitors per year.

For more targeted outreach, the Program distributed quarterly e-newsletters to participating residents. The e-newsletters are filled with water savings tips, upcoming events and other interesting articles. They are usually timed around changes in the weather to help signal the need for residents to adjust their irrigation systems, such as daylight savings coupled with a message to dial back sprinkler systems. The e-newsletter reaches 6,300 households.

Every year the WEP selects 3 public events to attend for the public to interact with local water efficiency staff. This provides an opportunity for the region to communicate its messages in person. Events have included the Sacramento Home & Landscape Show at Cal Expo, Creek Week, Harvest Day, Farm-to-Fork Festival and several Earth Day events. Additionally, RWA, in coordination with participating local water providers, hosts an annual Mulch Mayhem event in which customers can pick up a truck load of free mulch from selected locations throughout the region. All in-person regional events were canceled in 2020 due to the COVID-19 pandemic.

The Program is also very active in communicating to local media outlets such as the Sacramento Bee. Between 2016 and 2020, RWA issued 50 press releases on WEP activities and regionally significant news and participated in nearly 30 public affairs radio interviews. The RWA and the WEP were mentioned in dozens of news articles published by local and regional media outlets both within and outside of the Sacramento region during the same time frame.

To support public outreach messaging and water savings tips, the Program also coordinated several regional rebate programs, which were partially funded by state and federal grants. A variety of rebate options were provided including toilets, clothes washers and irrigation controls. Collectively these rebates and installations will produce an estimated lifetime (10 years) savings of 6 billion gallons of water and 6.4 million kilowatt hours (kWhs) of energy.

In addition to public outreach, the Program also coordinates school education activities. Since 2012, the Program has hosted the Water Spots Video Contest for high school and middle school students. The WEP provides a new contest theme each year and provides the region's teacher and students with relevant facts and images to help develop 30 second video PSAs. Students submit their videos to RWA who hosts a panel of local celebrities including Monica Woods from ABC 10 to decide on a first, second and third place winner. The top 10 scoring videos are then posted online for public voting to select a "people's choice" winner as well. Both teachers and student receive cash prizes and the winning videos are played at Raley Field during River Cats games and in select movie theaters throughout the region. The winning PSAs are incorporated into the WEP's media activities as well. Past themes include WATER MYTHS BUSTED!, H2o Hero, and Show Off Your Water Smarts. Between 2016 and 2019, 450 videos were submitted (average of 90 videos a year). The 2020 Water Spots Video Contest was canceled due to the COVID-19 pandemic.

Implementation of this DMM is active and ongoing.

Programs to Assess and Manage Distribution System Real Loss

The City's water loss assessment and management program includes annual water audits and an ongoing leak detection and repair. This includes an ongoing meter calibration and replacement program for all production and distribution meters. The City's activities include:

- Annual water audit and water balance
- Proactive leak identification and repair in the City's distribution system
- Annual meter calibration and replacement program

Water Conservation Program Coordination and Staffing Support

The City funds a full-time Administrative Analyst that acts as our water conservation coordinate on a part-time basis to run the City's water conservation programs. The City budgets $25,000 annually for water conservation rebates. The conservation budget is used to fund various rebate and conservation and education programs. The City works with customers, neighboring water suppliers and RWA to promote conservation through public education, water audits, landscape studies to affect water conservation, and monitoring conservation efforts.

4.3.2 Recent DMM Activities

The City has continued to promote and implement water conservation actions with great success. Since prior to the 2013 to 2016 drought, the City reached remarkable on-going conservation levels through the attentive actions of its citizens. Highlights of the City's recent actions and conservation measures include:

- Facilitating children's education activities through its Children's Conservation Connection.
- Providing flyers and brochures, updated throughout the year .
- Respond to over 81 service calls per year and fixing over 43 leaks per year in the distribution system.
- Offering rebate programs for the following water conservation fixtures and activities:
  - WaterSense labeled toilets
  - WaterSense labeled smart irrigation controls
  - WaterSense labeled showerheads

4.3.3 Planned DMM Activities

In addition to ongoing water conservation commitments, the City will continue to evaluate the need for additional programs and actions necessary to achieve water use objectives in compliance with California Water Code Section 10609.20. Resources will be dedicated in the City's budget for demand management activities which will help comply with these future water use objectives. Special consideration will be taken regarding changing urban water use patterns in the service area as well as the configuration of anticipated new residential customers to assure use remains efficient.

4.4 Forecasting Customer Use

Forecasting future water demand begins with an understanding of existing customer demands and trends, recognizing the additional customers expected through growth, and considering the factors that will influence the water use of both existing and new customer well into the future – especially factors that directly affect the efficiency of water use.

Pursuant to California Water Code 10610.4(c), an urban water supplier "*shall be required to develop water management plans to actively pursue the efficient use of available supplies*." One challenge from this directive is reflecting how the pursuit of efficient use is best represented in the forecast water uses that are the cornerstone of good planning. As required by the Act, the future water uses of both existing customers and those added over the 25-year planning horizon should reflect the "efficient use" of water.

4.4.1 Representing Current Customer Water Use

Table 4-1 and Table 4-2 provided the actual monthly customer water use for 2016 through 2020. From this information, an estimate of the representative "current" water use by existing customers has been developed. Knowing that actual use by existing customers varies slightly year-to-year based on a variety of factors (e.g. total rainfall and the timing of spring rain events impacting when landscape irrigation may begin), the recent data provides a basis for estimating current water use. An average of the 2016 through 2019 metered volumes by classification is used as a proxy for "current" water use for each customer classification, which allows a baseline from which to estimate the future use of these existing customers.

Importantly, the 2020 single-family and industrial actual use was not included in estimating representative "current" water use, since these two classifications appear to have been skewed by pandemic conditions during 2020 (see subsection 4.1.2).

This target total 'current water demand' was then estimated using customer-type demand factors and 2020 connection by classification (see Table 2-1) to generate a comparable estimate. This representative quantity of produced water (the volume entering the water distribution system from the water treatment facility) for current conditions provides the foundation for estimating the future needs of these existing customers. Table 4-6 provides the representative monthly and annual total water quantities, including customer needs, estimated distribution system losses, and estimated water treatment plant process water. Values are rounded to the nearest 10 acre-feet to represent these values as estimates.

Table 4-6: Representative Current Produced Water (acre-feet)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Current Use	790	690	820	940	1,410	1,640	1,830	1,760	1,530	1,370	990	710	14,480

4.4.2 Factors Affecting Future Customer Use

There are several factors that affect the forecast of future customer use, ranging from State and local landscape regulations, building code requirements, and other water-use mandates, to changes in the types of housing products being offered. These factors are incorporated into determining appropriate per-dwelling unit or per customer connection water demand values for use in forecasting future water needs. Relevant characteristics of the factors are described here.

Water Conservation Objectives

In 2009, Governor Arnold Schwarzenegger signed Senate Bill No. 7 (SBX7-7), which established a statewide goal of achieving a 20 percent reduction in urban per capita water use by 2020 for urban retail water suppliers.[44] As presented previously, the City has met this mandated target.

Furthermore, the efforts undertaken by the City and its customers to meet these targets, as well as efforts throughout the State by other urban retail suppliers, have changed the availability and use of appliances, fixtures, landscapes and other water using features, through changes or additions to ordinances and/or through a continuing "conservation ethic."

In response to the recent multi-year drought conditions, Governor Brown issued Executive Order B-37-16 in May 2016 entitled "*Making Water Conservation a California Way of Life*." In May 2018, Governor Brown signed into law SB 606 and AB 1668, which imposed additional statutory requirements above and beyond the 20 percent by 2020 target reflected in the 2009 legislation. This is expected to result in continued efforts to increase water use efficiency and ultimately to reduce water demands of existing water users and continue to influence the expected demands of future water users.

Requirements in California Code

Beginning in January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (hereafter the "CAL Green Code") requiring the installation of water-efficient indoor and outdoor infrastructure for all new projects after January 1, 2011. The CAL Green Code was incorporated as Part 11 into Title 24 of the California Code of Regulations, and was revised in 2013 and 2016 to address changes to the State's Model Water Efficient Landscape Ordinance ("MWELO") adopted during the drought.[45] Revisions to the CAL Green Code in 2019 modified sections to direct users to MWELO regulations contained in other regulatory sections.[46]

The CAL Green Code applies to the planning, design, operation, construction, use and occupancy of every newly constructed or remodeled building or structure. All new residential and non-residential

[44] California Water Code § 10608.20.

[45] The 2016 Triennial Code Adoption Cycle consisted primarily of the MWELO updates adopted in response to the drought. Indoor infrastructure changes were limited to some minor non-residential fixture changes and changes to the voluntary Tier 1 and Tier 2 requirements. Additionally, the Code was updated to match the new Title 20 Appliance Efficiency Regulations.

[46] The 2019 updated sections to direct CAL Green code users to Title 23 of the California Code of Regulations to allow Title 23 to be the sole location of MWELO requirements.

customers must meet the water use requirements of the CAL Green Code as well as the outdoor requirements described by MWELO. The CAL Green Code's requirements generally manifest through: (1) installation of plumbing fixtures and fittings that meet the 20 percent reduced flow rate specified in the CAL Green Code, or (2) by demonstrating a 20 percent reduction in water use from the building "water use baseline."[47] Future customers are expected to satisfy one of these two requirements through the use of appliances and fixtures such as high-efficiency toilets, faucet aerators, on-demand water heaters, or other fixtures as well as Energy Star and California Energy Commission-approved appliances.

California Model Water Efficient Landscape Ordinance and County Ordinance

The Water Conservation in Landscaping Act was enacted in 2006, and has since been revised and expanded multiple times by DWR resulting in today's MWELO.[48] In response to Governor Brown's executive order dated April 1, 2015, (EO B-29-15), DWR updated the MWELO and the California Water Commission approved the adoption and incorporation of the updated State standards for MWELO on July 15, 2015. MWELO requires a retail water supplier or a county to adopt the provisions of the MWELO or to enact its own provisions equal to or more restrictive than the MWELO provisions.[49] The changes included a reduction to 55 percent of reference evapotranspiration rates for the maximum amount of water that may be applied to residential landscapes, and non-residential projects to 45 percent, which effectively reduces the landscape area that can be planted with high water use plants, such as turf. For residential projects, the allowable maximum coverage of high-water use plants is reduced to 25% of the landscaped area (down from 33%). The newly updated MWELO also now applies to new construction with a landscape area greater than 500 square feet (the prior MWELO only applied to landscapes greater than 2,500 square feet).[50] The City reviews all new development for conformance with these standards.

Metering, Volumetric Pricing, and Water Budgets

California Water Code section 525 requires water purveyors to install meters on all new service connections after January 1, 1992. California Water Code Section 527 requires water purveyors to charge for water based upon the actual volume of water delivered if a meter has been installed. This action alone is not expected to substantially reduce water use. However, it is anticipated that the retail billing system will encourage and help maintain reasonable use, so that individual customer water demands are reasonably not expected to increase over time.

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[47] See CAL Green Code. For Residential construction, Section 4.303.1 provides the residential water conservation standard and Table 4.303.2 identifies the infrastructure requirements to meet this standard. Table 4.303.1 and Worksheets WS-1 and WS-2 are to be used in calculating the baseline and the reduced water use if Option 2 is selected. For non-residential construction, Section 5.303.2.3 provides the water conservation standard as well as the baseline and reduced flow rate infrastructure standards. Note that Worksheets WS-1 and WS-2 incorporate both residential and non-residential fixtures, yet the water use is still to be analyzed by "building or structure" as specified in Chapter 1, Section 101.3.

[48] Gov. Code §§ 65591-65599

[49] The City has incorporated the MWELO requirements into Code of Ordinances at Title 8, Chapter 5, Article 60.

[50] CCR Title 23, Div. 2, Ch. 27, Sec. 490.1.

4.4.3 Customer Water Use Forecast

Forecasting future water demands begins with an understanding of existing customer demands and trends, recognizing the additional customers expected through growth, and considering the factors that will influence the water use of both existing and new customers well into the future – especially factors that directly affect the efficiency of water use.

Pursuant to California Water Code 10610.4(c), an urban water supplier "*shall be required to develop water management plans to actively pursue the efficient use of available supplies*." One challenge from this directive is reflecting how the pursuit of efficient use is best represented in the forecast water uses that are the cornerstone of good planning. As required by the Act, the future water uses of both existing customers and those added over the 25-year planning horizon should reflect the "efficient use" of water.

Existing Customer Future Use

To be conservative and assure the analysis of water system reliability is adequate (see Chapter 5), the City is maintaining the annual "current" retail customer potable water use as shown in Table 4-6, a total delivered quantity of about 12,930 acre-feet, with a total production need of about 13,780 acre-feet when considering distribution system losses, and a total of 14,480 acre-feet when considering necessary WTP processing water. Additionally, as recognized with the analysis of 2020 gpcd use, the existing customers have undertaken water use reductions to date.

While these existing customers may undertake a variety of additional conservation measures – actively through decisions to modify a behavior or a water use, or passively through the purchase of appliances and fixtures that simply use less water – they may also maintain their use as-is. Holding the current use as a constant for all existing customers into the future will provide a conservative number that can be re-evaluated prior to the 2025 UWMP and the compliance with forthcoming water use objectives.[51]

New Customer Future Use

As detailed in Chapter 2, the City anticipates continued growth with an associated increased demand placed upon the City's water supplies. Forecasting the needs of these future customers is dependent upon the type and number of customers and the unit water demand factors associated with each customer type.

For this UWMP, two distinct customer classifications are anticipated: (1) residential, and (2) non-residential. Residential customers will include both single-family dwelling units built under a variety of densities, and multi-family residential dwelling units. Non-residential uses are expected to include a blend of commercial, institutional, industrial and active landscapes, such as parks, in ratios similar to the City's current residential-to-non-residential customers.

[51] Per California Water Code Section 10609.20, urban water suppliers shall calculate a water use objective composed of, among other factors, aggregated efficient indoor water use based upon standards of no more than 55 gpcd.

Values developed for each distinct land use are based on several sources of information, details of which are provided in the following subsections.

New Residential Customer Water Use

Table 2-7 summarized the City's anticipated new residential growth over the UWMP planning horizon. This growth provides the basis for the estimated future customer water needs, as the non-residential customers will be a ratio of the new residential customers. Table 4-7 presents the relevant residential growth information from Table 2-7.

Table 4-7: Anticipated New Residential Units (from Table 2-7)

Category	Cumulative Forecast				
	2025	2030	2035	2040	2045
Total Housing Starts over 5-years	750	1,000	1,250	1,500	1,500
New Single-Family Units	563	750	938	1,125	1,125
New Multi-family Units	188	250	313	375	375
Total New Housing Units	750	1,750	3,000	4,500	6,000

The City anticipates these new residential elements will be built in accordance with all applicable building codes including the Cal Green Code discussed previously, and relevant City ordinances.

Distinct demand factors are provided for the following residential uses:

- Indoor Residential Use – this category identifies the generally anticipated water use for single-family and multi-family dwelling units.
- Outdoor Residential Use – this category addresses the landscape water demands commonly anticipated for the two primary dwelling unit types.

For purposes of this UWMP, residential unit water demand factors are described as "the acre-feet of water use annually per dwelling unit" – or acre-feet/dwelling unit ("af/du").

Residential indoor water demands are estimated using an assumed value of 55 gallons-per person per day, multiplied by the assumed occupancy rates for anticipated residential densities for single-family or multi-family classifications in the City. The assumed per-person rate of 55 gallons per day is derived from California Water Code Section 10609.4(a)(3), which states a value of 55 gallons per capita (i.e., per person) per day ("gpcd") be used for estimating indoor residential use targets.[52] If lower standards are required when the growth occurs, the forecast use would be expected to be lower than estimated in this UWMP.

[52] Water Code Section 10609.4(a) also establishes the indoor residential water use 'standard' to be 52.5 gpcd beginning in 2025 and as low as 50 gpcd by 2030, though the Water Code also provides provisions for the water use target to revert above 50 gpcd. For purposes of this UWMP, the higher value of 55 gpcd is assumed.

Based on this per-capita assumption, the following indoor per-dwelling unit value is assumed for each new residential unit:

- Single-family residential indoor use: 0.19 acre-feet per year based upon an assumed occupancy of 3.11 people per unit (see Chapter 2.2.4).
- Multi-family residential indoor use: 0.15 acre-feet per year based upon an assumed occupancy of 2.5 people per unit[53]

Outdoor residential water use is primarily a factor of lot size and the type and extent of landscaped area. The City's anticipated growth will likely include a range of residential densities (e.g. houses per acre) and therefore an estimated "typical" lot is assumed for purposes of forecasting.

As represented in Table 2-5, several anticipated projects are recognized by the City which will reflect a range of housing types, densities and configurations that affect the irrigable area for each lot. For purposes of this UWMP, each new single-family residential unit is anticipated to have a total gross area of 7,000 square-feet, with 3,000 square-feet anticipated to be irrigable (after accounting for the home footprint, driveways, walkways, other hardscapes, and non-irrigated areas. Multi-family units, which typically have shared common landscape areas, are assumed to have 300 square-feet of irrigable area per unit.

Outdoor demands for new residential dwelling units are calculated based on regulations defined under the MWELO. The MWELO provides for determining the Maximum Applied Water Allowance (MAWA) where the maximum is calculated as 55 percent of the reference evapotranspiration for the area for every square foot of landscaped area, resulting in the following equation:

> *MAWA = (ETo)(0.62)(0.55 x LA), where ETo is the reference evapotranspiration in inches per year, and LA is the landscape area in square-feet. 0.62 is a conversion factor to gallons. The resulting value is in "gallons per year."*

A primary factor in this calculation is evapotranspiration ("ET"). The methodology directs the use of ET from a reference crop, such as maintained grass – a value referred to as ETo. For this UWMP, the ETo is 52.6 inches per year (4.4 feet per year).[54]

Using the MAWA equation, outdoor demand factors for each residential lot category are calculated:

- Single-Family Residential – Anticipated single-family dwellings are conservatively assumed to be constructed on lots averaging 7,000 sf, with an average landscape area of 3,000 sf. The resulting outdoor demand factor is forecast to be 0.17 acre-feet per dwelling unit per year.

- Multi-Family Residential – Anticipated multi-family dwellings will have larger common areas, assumed to equate to 300 sf of landscape area per unit. The resulting outdoor demand factor is forecast to be 0.02 acre-feet per dwelling unit per year.

[53] The multi-family residential occupancy rate is an estimate.

[54] ETo is from the CIMIS Station 235 (Verona) available at: https://cimis.water.ca.gov/Default.aspx

The resulting forecast water use for existing and new residential customers is provided in Table 4-9.

New Non-Residential Customer Water Use

The City anticipates several acres of non-residential uses to be developed in the future to accompany the residential growth. Non-residential per-connection demand factors were also estimated for purposes of forecasting the water needs of these anticipated commercial, institutional, industrial and irrigated landscape customers. For purposes of this UWMP, the City assumes non-residential connections will mimic the existing residential to non-residential ratios, where non-residential connections represent about 10% of the total current connections. Table 4-8 provides the resulting assumed additional connections for commercial, institutional, and industrial (grouped as CII) and landscape irrigation (e.g. parks and recreational areas).

Table 4-8: Future Non-Residential Connections

Category	Cumulative Connections				
	2025	2030	2035	2040	2045
CII	60	140	230	350	470
Landscape	30	60	100	150	200

For purposes of this 2020 UWMP, demand factors were developed for the two categories of non-residential use: Commercial, institutional, and industrial (CII), and Irrigated Landscape.

- CII Connections – this customer classification includes a wide array of different uses from neighborhood retail centers, to large retail centers, to office and government buildings, to light and even heavy industrial uses. To reflect this variety, each acre of new CII use is assumed to use of 1.25 acre-foot per connection is assumed, which matches the City's current CII customers average annual use per connection.
- Irrigated Landscape – this classification includes passive and active parks, streetscapes, and other dedicated landscape areas. Each landscape connection is assumed to have an average annual water need of 2.5 acre-feet per connection. This is based upon the City's existing use for landscape connections.

The resulting forecast future use of existing and new non-residential customers is provided in Table 4-9.

4.4.4 Summary of Forecast Water Use

Based upon the estimated water use of the existing and new customers, the City anticipates an increase in potable water use over the planning horizon while also reflecting the full contract quantity for non-potable uses. Table 4-9 presents the resulting customer water use forecast. Although the forecast is presented on an annual basis in 5-year increments through 2045, the monthly pattern is expected to mimic the current monthly pattern detailed in prior tables (e.g. Table 4-5). This characterization is important when evaluating the City's water service reliability as detailed in Chapter 5.

Table 4-9: Forecast Future Water Use (values in acre-feet per year)

Classification		2025	2030	2035	2040	2045
Existing	Single-family Residential	7,050				
	Multi-family Residential	1,620				
	Commercial/Institutional	1,540				
	Industrial	1,750				
	Landscape Irrigation	950				
	Other	20				
New	Single-family Residential	200	470	810	1,220	1,630
	Multi-family Residential	30	70	120	180	240
	CII	80	180	290	440	590
	Landscape	75	150	250	375	500
Potable Customer Water Use Subtotal		13,315	13,800	14,400	15,145	15,890
Distribution System Water Loss		910	940	980	1,040	1,090
Total Potable Water Use		14,225	14,740	15,380	16,185	16,980
Treatment Plant Process Water		710	740	770	810	850
Total Diversion		14,935	15,480	16,150	16,995	17,830

4.4.5 Adjusting Water Use Forecasts for Single-Dry and Multiple Dry Conditions

The demand forecasts presented in the prior subsection represent expected water needs under normal hydrologic conditions. To credibly forecast potential maximum future water use, the forecasted normal-year water uses must be modified to reflect anticipated increases in demand during drier conditions.

Conservative modifications to the forecasted normal year water use to more likely reflect use conditions during drier and dry years are warranted to help adequately address water service reliability in Chapter 5. For purposes of this UWMP, the following adjustment is made:

- Single dry year: Landscape irrigation needs would increase to reflect the generalized earlier start of the landscape irrigation season due to limited rainfall in the single driest year. Since this increase only applies to the outdoor portion of a customer's forecast use, an adjustment factor of 5% is applied to the total normal-year forecasts to conservatively reflect the expected increase in demand for water for landscaping.
- Multiple dry years: During multiple dry years, demands are also expected to increase similar to the single dry year. For multiple dry year conditions, the single dry year increase of 5% is held in each of the subsequent years. This is representative of an "unconstrained demand" as should be represented when evaluating whether Water Shortage Contingency Plan actions may be warranted.[55]

[55] California Water Code Section 10632(a)(2) states water suppliers should use "unconstrained demand" when performing their annual water supply and demand assessment.

These values are reflected in tables provided for the Drought Risk Assessment and Annual Reliability Assessment presented in later subsections.

4.4.6 Climate Change Considerations

Including climate change analysis into a water use analysis will assist the City in understanding the potential effects on long-term reliability, which in turn, allows the City to proactively begin planning appropriate responses. For example, hotter and drier weather may lead to an increased demand in landscape irrigation, especially during spring and fall months, increasing the pressure on water supplies that may have availability restrictions during these periods.

This potential is reflected in the consideration of the single dry year increase of 5% that is used for the water service reliability analysis, as discussed previously. Whether the elevated single dry year water forecast becomes more akin to the "normal" demand will become more apparent as the City continues to assess monthly water use trends throughout its service area.[56]

4.5 Forecasting Water Use for the DRA and Annual Assessment

The California Legislature created two new UWMP requirements to help suppliers assess and prepare for drought conditions: The Drought Risk Assessment,[57] and the Annual Water Supply and Demand Assessment.[58] These new planning requirements were established in part because of the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change.

The Drought Risk Assessment (DRA) requires assessing water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.

As a slight variant, the Annual Water Supply and Demand Assessment (Annual Assessment) undertakes a similar analytical exercise as the DRA but is to focus on actual, and not hypothetical, conditions anticipated for the upcoming water year. The previously presented water use forecasts facilitate both of these planning exercises as described in the following subsections.

4.5.1 Projecting Water Use for 5-year Drought Risk Assessment

A critical component of new statutory language for the 2020 UWMP cycle is the requirement to prepare a five-year DRA using a supplier-defined hypothetical drought conditions expected to occur from 2021 through 2025. This drought condition is meant to allow suppliers to test the resiliency of their water supply portfolio and their Water Shortage Contingency Plan actions to meet severe conditions.

[56] A closer assessment of the correlation of monthly water use by customer type to rainfall and temperature will help the City improve water use forecasts to assure the effects of climate change are adequately being reflected in water service reliability analyses.

[57] California Water Code Section 10635(b)

[58] California Water Code Section 10632.1

DWR recommends that suppliers first estimate expected water use for the next five years without drought conditions (also known as unconstrained demand). In other words, unconstrained demand is water demand absent any water supply restrictions and prior to implementing any short-term WSCP demand reduction actions. If normal water use includes water conservation programs, either currently implemented or planned for implementation, estimated water use values would incorporate the effect of those conservation programs when reporting projected water use during this period.

Total water use for 2021, for example, is developed by modifying the water use representation for "current" conditions (see Table 4-6) taking into consideration the anticipated factors affecting water use, with each subsequent year further adjusted, as appropriate. Adjustments year-to-year reflect several factors the City anticipates may occur, including increases from growth. To make these adjustments, the difference in annual water use between the "current" condition and the forecast potable use in 2025 is prorated equally across each of the years 2021 through 2025, so that the same 2025 forecast water use is matched.

With an initial annual estimate, each year is further adjusted to reflect anticipated increases in the "unconstrained demand" during a single dry year. As noted previously, this is reflected by applying a 5% increase to the total potable water use forecast. The resulting unconstrained demand during a dry year for 2021 through 2025 are shown in Table 4-10.

Table 4-10: Forecast DRA Water Use for 2021 through 2025 (acre-feet per year)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2021	830	730	870	990	1,490	1,730	1,930	1,860	1,620	1,450	1,050	750	15,300
2022	840	730	870	1,000	1,500	1,740	1,950	1,870	1,630	1,460	1,050	750	15,390
2023	850	740	880	1,010	1,510	1,750	1,960	1,880	1,640	1,470	1,060	760	15,510
2024	850	740	880	1,010	1,520	1,770	1,970	1,890	1,650	1,470	1,070	760	15,580
2025	860	750	890	1,020	1,530	1,780	1,980	1,910	1,660	1,480	1,070	770	15,700

4.5.2 Projecting Water Use for Annual Assessments

The City will need to perform an Annual Assessment and submit the findings to DWR beginning in 2022. To evaluate the plausible water service reliability conditions for 2021 or 2022, described in Chapter 5, requires two separate representative "current" water use conditions to be developed. The first condition uses the "current" water use characterization included in Table 4-6. These demands represent the water use under a normal condition. Alternatively, a "single-dry year current" forecast is also calculated to provide the City with representative current unconstrained demands. This second characterization of current water use applies the same single-dry year adjustment described previously, represented by a 5% increase in the current water use values. Table 4-11 provides the Normal Year and Single Dry Year current water use for the City's water service area. These are used in Chapter 5.

Table 4-11: Normal and Single Dry Year "Current" Water Use (acre-feet)

Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal	790	690	820	940	1,410	1,640	1,830	1,760	1,530	1,370	990	710	14,480
Single Dry	830	720	860	990	1,480	1,720	1,920	1,850	1,610	1,440	1,040	750	15,210

4.6 Projecting Disadvantaged Community Water Use

Pursuant to CWC Section 10631.1, retail suppliers are required to include the projected water use for lower income households in 2020 UWMPs. Per California Health and Safety Code Section 50079.5, a lower income household has an income below 80 percent of area median income, adjusted for family size. For purposes of this UWMP, annual median income was derived from 2019 U.S. Census Bureau and determined to be about $62,000 for the City.[59] Therefore, 80% of this is estimated to be about $49,600 per year. According to the detailed data, approximately 42% of the households earn at or below this 80-percentile income.

For purposes of estimating the future water needs, 42% of the total single-family and multi-family connections are presumed to represent disadvantaged households, resulting in 26% of the future total potable water use. Applying this condition to the forecast water use for the entire City results in the estimate provided in Table 4-12.

Table 4-12: Estimated Low-Income Water Use Forecast (acre-feet)

	2025	2030	2035	2040	2045
Total Potable Use	14,225	14,740	15,380	16,185	16,980
Low Income Use	3,738	3,868	4,032	4,229	4,427
% of Total Potable	26%	26%	26%	26%	26%

[59] This data is from the Household Income in the Past 12 Months (In 2019 Inflation-adjusted Dollars) American Community Survey 1-year estimates https://censusreporter.org/profiles/16000US0686972-yuba-city-ca/

Chapter 5
Water System Reliability

This chapter provides the City's water system reliability findings as required under Water Code Section 10635 and provides reliability information that City may use in completing an annual supply and demand assessment pursuant to Water Code Section 10632.1.

Assessing water service reliability is the fundamental purpose for City in preparing its 2020 UWMP. Water service reliability reflects the City's ability to meet the water needs of its customers with water supplies under varying conditions. The City's UWMP considers the reliability of meeting customer water use by analyzing plausible hydrological variability, regulatory variability, climate conditions, and other factors that impact the City's water supply and its customers' water uses. The reliability assessment looks beyond the City's past experience and considers what could be reasonably foreseen in the future.

Moreover, the analysis posits that active supply management will be integral to the City's long-term water reliability. This chapter synthesizes the details embedded in the Chapters 3 and 4 and provides a rational basis for future decision-making related to supply management, demand management, and project development. This chapter presents three system reliability findings:

- Five Year Drought Risk Assessment: The 2021 through 2025 Drought Risk Assessment (DRA) for the City's service area.
- Long-Term Service Reliability: The reliability findings for a Normal Year, Single Dry Year, and Five Consecutive Drought Years in five-year increments through 2045.
- Annual Reliability Assessment: The reliability findings for an existing condition for both a Normal Year and Single Dry Year that can inform an annual supply and demand assessment for 2021 or 2022.

In short, through active management, City has reliable water supplies available for its service area through 2045.

5.1 Five Year Drought Risk Assessment

The Drought Risk Assessment is a new requirement for the 2020 UWMP cycle. The DRA requires a methodical assessment of water supplies and water uses under an assumed drought period that lasts five consecutive years. The City has prepared an independent monthly assessment of the water supplies and demands for its system because of the monthly variability associated with the water supplies that are used to serve that system.

The City has a unique water supply portfolio. The City currently has access to five sources of supply and each source has unique attributes that affect reliability under various hydrological and regulatory conditions. These supply sources are further complicated by the carryover and storage provisions available to some of the water assets. This diverse water supply portfolio creates a water management structure that requires careful consideration of hydrological, regulatory, and institutional variability. Specifically, some water assets are particularly susceptible to drought while other water assets have varying degrees of reliability based upon regulatory constraints and historical water use. Nevertheless, the City has organized and coordinated its water portfolio management to optimize water supply reliability in the event of a severe drought. The City's DRA represents a consolidation of its water supplies into an organized monthly management structure.

Table 5-1 below shows the City's DRA that integrates all of its supplies for 2021 through 2025 as described in Chapter 3 and reflects the dry year unconstrained water uses described in Chapter 4. As the table shows, the City has sufficient water assets available in all months under its prescribed water management protocol although some months have limited supplies as compared to the conservatively projected demands (unconstrained demands devoid of potential conservation savings).

Table 5-1: Five Year Drought Risk Assessment (acre-feet)

Five Year Drought		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2021	Supply	2,141	2,016	2,141	2,281	1,528	1,923	1,984	1,934	1,744	1,488	2,280	2,321	23,781
	Demand	835	729	866	993	1,490	1,733	1,934	1,860	1,617	1,448	1,046	750	15,300
	Difference	1,307	1,287	1,275	1,287	38	190	50	74	127	40	1,234	1,571	8,482
2022	Supply	2,141	2,016	2,141	1,031	1,528	1,943	1,982	1,912	1,684	1,578	2,100	2,141	22,198
	Demand	840	734	872	999	1,499	1,744	1,946	1,871	1,627	1,457	1,053	755	15,395
	Difference	1,301	1,283	1,269	32	29	199	36	41	57	121	1,047	1,386	6,802
2023	Supply	2,419	2,294	2,419	1,128	1,528	1,777	1,983	1,907	1,658	1,485	2,378	2,419	23,396
	Demand	845	738	877	1,006	1,508	1,754	1,958	1,883	1,637	1,466	1,059	760	15,491
	Difference	1,574	1,556	1,542	122	20	23	25	24	21	19	1,318	1,660	7,905
2024	Supply	2,141	2,016	2,141	1,031	1,528	1,778	1,986	1,907	1,659	1,485	2,100	2,141	21,914
	Demand	850	743	883	1,012	1,518	1,765	1,970	1,894	1,647	1,475	1,066	764	15,586
	Difference	1,291	1,274	1,259	19	10	13	16	13	12	10	1,034	1,377	6,327
2025	Supply	2,141	2,016	2,141	2,281	1,528	1,777	1,983	1,907	1,684	1,486	2,160	2,141	23,245
	Demand	856	747	888	1,018	1,527	1,776	1,982	1,906	1,657	1,484	1,072	769	15,682
	Difference	1,286	1,269	1,253	1,263	1	1	1	1	27	2	1,087	1,372	7,563

5.2 Long Term Service Reliability

The Urban Water Management Planning Act directs urban water purveyors to analyze water supply reliability in a normal, single dry, and five consecutive dry years over a 20-year planning horizon. The 2020 UWMP Guidebook recommends extending that period to twenty-five (25) years to provide a guiding document for future land use and water supply planning through the next UWMP cycle. The following subsections describe the long-term water service reliability for the City through a 25-year planning horizon.

5.2.1 Long Term Service Reliability

The City's long-term service reliability reflects the recommended 25-year planning horizon anticipating a normal, single dry, and five consecutive dry years from 2020 through 2045.

Normal and Single Dry Conditions 2025-2045

The City's future water supplies in normal and single dry conditions reflect the same hydrological, regulatory, and institutional criteria described in previous sections. In normal years, supplies are generally constrained only by their express limiting features. In dry years, additional hydrological, regulatory, and institutional issues will constrain the availability of water. However, future water supplies remain relatively constant as average demands grow over time. All of this information is described in detail in Chapters 3 and 4 and is reflected in the tables below.

The City's future water demands in normal and single dry conditions through 2045 reflect the same considerations described in previous sections of this chapter. In normal conditions, demands tend to reflect anticipated uses based upon normal hydrological conditions. But in dry conditions, demands increase to reflect dry conditions and additional application of water for outdoor irrigation. Future water demands are generally predicted to increase as land uses and populations within the City's service area grow. All of this information is detailed in Chapter 4 and reflected in the numbers shown in the tables below.

Table 5-2 shows the normal year supplies and demands on an annual timestep from 2025 through 2045.

Table 5-2: Normal and Single Dry Year Water Supply and Demand through 2045 (acre-feet per year)

Normal Year	2025	2030	2035	2040	2045
Supply	28,928	28,928	28,928	28,928	28,928
Demand	14,935	15,480	16,150	16,995	17,830
Difference	13,993	13,448	12,778	11,933	11,098

Single Dry Year	2025	2030	2035	2040	2045
Supply	24,439	24,439	24,439	24,439	24,439
Demand	15,682	16,254	16,958	17,845	18,722
Difference	8,757	8,185	7,482	6,594	5,718

Five Consecutive Dry Years 2025 – 2045

The City defines drought condition lasting five consecutive years as one that constrains the City from obtaining some of its water supplies in its water supply portfolio due to hydrological, regulatory, and institutional constraints. These conditions include more restrictive regulatory constraints on its water rights and constrained conditions for its water supply contracts. The restrictive conditions manifest in changes to the availability of the City's water assets during different periods in a given year but keep the annual volumes above the annual need. Moreover, these restrictive conditions may also impact the increased uses of available supplies in the future that are associated with land use and population growth. These conditions are described in significant detail in Chapter 3 and reflected in the tables below.

Five consecutive dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the City's customers. Demands in extended dry conditions may increase as hydrological conditions generate additional customer uses for outdoor irrigation. As droughts persist, however, demands may decline as the realistic constraints on supply availability are realized at the customer level. Out of an abundance of caution to ensure supplies are available to meet projected demands, the fluctuating demand pattern is not reflected in this future reliability assessment. The gradual increase in demands also account for reasonable water conservation measures derived from improved efficiencies in indoor fixtures, improved management of outdoor landscape irrigation, and a general awareness of the value of long-term water conservation at the consumer level. In addition, the future dry conditions reflect increased land use and populations that would rely upon available supplies. These variable conditions are described in significant detail in Chapter 4 and reflected in the tables below. Table 5-3 below shows the annual water supply and demand conditions for the City's service area in five consecutive dry years from 2025 through 2045.

Table 5-3: Five Consecutive Dry Years Water Supply and Demand through 2045 (acre-feet per year)

		2025	2030	2035	2040	2045
Year 1	Supply	26,363	26,363	26,363	26,363	26,363
	Demand	15,682	16,254	16,958	17,845	18,722
	Difference	10,681	10,109	9,406	8,518	7,642
Year 2	Supply	23,290	23,290	23,290	23,290	23,290
	Demand	15,796	16,395	17,135	18,020	18,722
	Difference	7,493	6,895	6,155	5,269	4,568
Year 3	Supply	21,366	21,366	21,366	21,366	21,366
	Demand	15,911	16,535	17,312	18,195	18,722
	Difference	5,455	4,830	4,053	3,170	2,644
Year 4	Supply	20,650	20,650	20,650	20,650	20,650
	Demand	16,025	16,676	17,490	18,371	18,722
	Difference	4,624	3,973	3,160	2,279	1,928
Year 5	Supply	23,099	23,099	23,099	23,099	23,099
	Demand	16,140	16,817	17,667	18,546	18,722
	Difference	6,960	6,282	5,432	4,553	4,378

5.3 Annual Reliability Assessment

The City may consider current supply and demand conditions and perform an annual water supply and demand assessment (Annual Assessment) pursuant to Water Code Section 10632.1 to evaluate real-time or near-term circumstances that are different than the DRA scenario. This assessment would evaluate actual current water supply and use conditions. For purposes of this UWMP, the "current" water use conditions as described in Chapter 4 are compared to the availability of the City's existing water supplies as described in Chapter 3. Two scenarios are illustrated for the City's service area:

- Normal Year condition: reflecting the availability of supplies under normal conditions and the "current" water uses
- Single-Dry Year condition: reflecting the availability of supplies under a severe, single-dry year and elevated "current" water uses reflecting increased demands expected in a single dry year.

5.3.1 Normal Year Supply and Current Water Use

The City defines a normal year condition as one that allows the agency to obtain water supplies from all sources in its water supply portfolio under normalized conditions. These conditions include normally anticipated regulatory constraints on its water rights and limited constrained conditions for its water supply contracts. These conditions are described in significant detail in Chapter 3 and reflected in the monthly supply determinations shown below.

Normal year demands include the anticipated demands based upon historical trends in water usage in non-drought conditions by the City's customers. Demands in normal conditions generally are lower in the wetter months and higher in the drier months. These demands may fluctuate over time as land uses and populations change within the City's service area. The monthly demands also account for reasonable water conservation measures derived from improved efficiencies in indoor fixtures, improved management of outdoor landscape irrigation, and a general awareness of the value of long-term water conservation at the consumer level. These demand conditions are described in significant detail in Chapter 4 and reflected in the monthly demand assessments shown below.

Table 5-4 below shows the normal year water supply and demand conditions for the City's service area on a monthly timestep.

Table 5-4: Normal Year Water Supply and Demand (acre-feet)

Normal Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Supply	2,247	2,519	2,519	2,700	3,011	2,287	1,938	1,938	2,108	2,895	2,519	2,247	28,928
Demand	790	690	820	940	1,410	1,640	1,830	1,760	1,530	1,370	990	710	14,480
Difference	1,457	1,829	1,699	1,760	1,601	647	108	178	578	1,525	1,529	1,537	14,448

5.3.2 Single Dry Year Supply and Dry-Year Current Demand

The City defines a single dry year condition as one that constrains the City from obtaining some of its water supplies in its water supply portfolio due to hydrological, regulatory, and institutional constraints. These conditions include more restrictive regulatory constraints on its water rights and significantly constrained conditions for its numerous water supply contracts. The restrictive conditions manifest in changed availability of some City water assets in various months depicted in the tables below. These changed monthly water supply conditions are described in significant detail in Chapter 3.

Single dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the City's customers. Demands in dry conditions may increase in the normally wetter months as denuded hydrological conditions generate additional customer uses for outdoor irrigation. These conditions are described in detail in Chapter 4 and reflected in the monthly demand tables below. The analysis uses the "current" water use, adjusted as described in Chapter 4.

Table 5-5 below shows the single dry year water supply and demand conditions for the City's service area.

Table 5-5: Single Dry Year Water Supply and Demand (acre-feet)

Single Dry Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Supply	2,419	2,294	2,419	2,378	1,498	1,747	1,953	1,851	1,620	1,463	2,378	2,419	24,439
Demand	830	725	861	987	1,481	1,722	1,922	1,848	1,607	1,439	1,040	746	15,204
Difference	1,590	1,570	1,558	1,391	18	25	32	3	14	25	1,338	1,674	9,235

5.4 Water Supply Reliability Summary

The City has a diverse and robust water supply portfolio capable of meeting the water demands in its service area in normal, single dry, and five consecutive dry years from 2020 through 2045 so long as active management of its supply portfolio occurs. The City's diverse water supply portfolio requires coordinated water management between the City and its contract partners – DWR and NYWD – in order to render the supply reliable in all year types through 2045.

Chapter 6
Water Shortage Contingency Plan

This Water Shortage Contingency Plan (WSCP) addresses the requirements in Water Code Section 10632 of the Urban Water Management Planning Act (The Act). The WSCP is incorporated into the 2020 Urban Water Management Plan (UWMP) and is used by the City of Yuba City (the City or Yuba City) to respond to water shortage contingencies as they may arise. The WSCP addresses possible conditions in which the water supply available to customers of the City is insufficient to meet the normally expected customer water use at a given point in time due to drought, regulatory action constraints, and natural and man-made disasters. This WSCP describes the City's strategy for allocating water during such water supply shortages, while assuring customers that at all times it will meet the minimum health and safety requirements of a drinking water purveyor.

This WSCP consists of the following required elements:

1. An analysis of water supply reliability.
2. Procedures for conducting an annual water supply and demand assessment.
3. Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage.
4. Shortage response actions that align with the defined shortage levels.
5. Communication protocols and procedures.
6. Customer compliance, enforcement, appeal, and exemption procedures.
7. A description of legal authorities.
8. A description of financial consequences.
9. Monitoring and reporting requirements.
10. Reevaluation and improvement procedures.
11. Special Water Feature Distinction.
12. Plan Adoption, Submittal, and Availability.

The Act contains specific requirements for each of these elements.[60] As required by Water Code Section 10632 this WSCP is incorporated into the UWMP, yet it is also a stand-alone plan that is adopted independently from the UWMP and may be amended or refined and readopted over coming months and years as needed (see subsection 6.12 Plan Adoption, Submittal, and Availability, below).

6.1 Water Supply Reliability Analysis

Yuba City is located in eastern Sutter County on the western bank of the Feather River. Located adjacent to the east of the Feather River is the City of Marysville, and to the north, west, and south is generally undeveloped agricultural land. The City delivers quality, reliable water to a population of approximately 70,000 located in a 15 square mile service area within and just outside of its City limits (see Chapter 2). The City's water source is surface water from the Feather River, with a small supplemental groundwater supply available at the water treatment plant, and independent non-potable groundwater wells used to irrigate City parks (Blackburn-Talley, Regency, Gauche Aquatic Park, Sam Brannan, and Northridge.

As described in Chapter 5 of the UWMP, the City has a reliable water through 2045. The City has a diverse and robust water supply portfolio capable of meeting the water demands in its service area in normal, single dry, and five consecutive dry years from 2020 through 2045 so long as active management of its supply portfolio occurs. The City's diverse water supply portfolio requires coordinated water management between the City and its contract partners – DWR and NYWD – in order to render the supply reliable in all year types through 2045. Although Yuba City has a secure water supply, this WSCP serves as a roadmap to help the City meet the challenges that may arise from future droughts, regulatory actions, and unforeseen man-made and natural disasters.

6.2 Annual Water Supply and Demand Assessment Procedures

The WSCP describes the City's procedural methodology for managing shortages and conducting its required Annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment is to be submitted to California Department of Water Resources (DWR) by July 1 each year with the first Annual Assessment due July 1, 2022. The Annual Assessment examines Yuba City's anticipated water reliability for the current year and one additional dry year. The Annual Assessment will be prepared at the beginning of each calendar year to evaluate near-term water supply reliability and determine what, if any, water shortages stages may be triggered during the required period. The Annual Assessment will be used by Yuba City decision-makers to prepare for and initiate implementation of any needed response actions, as well as to inform customers, the general public, interested parties, and local, regional, and state governmental entities to prepare for such required actions.

[60] California Water Code Section 10632, available at: (https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10632)

6.2.1 Analytical and Decision-making Processes

Yuba City plans to conduct its Annual Assessment according to the following timeline and process:

By February 1	Initial data collection and analysis
By March 1	Preliminary Draft Annual Assessment internal review and revisions
By April 1	Draft Annual Assessment and results briefing for Yuba City decision-makers
By May 1	Public Notification and Release of Draft Annual Assessment
By June 1	Approval of Annual Assessment by Yuba City Decision-makers
By June 15	Submit Annual Assessment to DWR in advance of July 1 deadline

The City will prepare its Annual Assessment using the following key data and analytical procedures (which may be modified as needed):

- The Water Treatment Plant Supervisor and Chief Plant Operator will utilize their Standard Operating Procedure spreadsheet to prepare supply estimates for each water source on a monthly basis for the analysis period, considering desired reservations of supplies in the event the following year is also dry (e.g. maintain a pre-determined minimum as SWP Carryover supply for a future year).
- Update unconstrained customer demand and estimate anticipated actual water use on a monthly basis for the analysis period.
- Update infrastructure assessment, including estimated water supply production capability on a monthly basis for the analysis period.
- Identify and quantify any locally applicable factors that may influence or disrupt supplies during the analysis period.
- Refine the definition of "dry year" as relevant to dry conditions like water year 2015 and 2021, especially as related to recently realized constraints on water supply availability .
- Identify any shortfall between projected available supply for the upcoming year and anticipated unconstrained demand.
- Identify and incorporate any applicable constraints (infrastructure, regulatory, etc.).
- Develop, analyze, and propose water resource management strategies to address any shortfall between projected supply and anticipated demand with reference to the water shortage stages identified in this WSCP.
- Present the Annual Assessment (and resulting water shortage stage declaration, if applicable) to the City decision-makers.

If the results of the Annual Assessment indicate the need for any alternative water shortage response actions which may be addition to those specified in Subsection 6.4, below, the alternative response actions will be described and submitted in the Annual Assessment, as specified in CWC 10632.2.

6.2.2 Submittal Procedure

The City will submit its Annual Assessment to the DWR via email by June 15 each year, but in no case later than July 1 each year. Prior to DWR submittal, Yuba City will also notify Sutter County Office of

Emergency Services, Cal Water, the City of Marysville, the public, and other stakeholders concerning the results of the Annual Assessment and where it is available for review.

6.3 Six Standard Water Shortage Stages and Triggers

New state requirements for the WSCP require water suppliers to adopt six water shortage stages, which correspond to progressively severe water shortage conditions (up to 10%, 20%, 30%, 40%, 50%, and greater than 50% percent shortage), as compared to the normal service reliability condition. The City has adopted the six standard water shortage stages. Each stage corresponds to a range of reduction in anticipated water supply availability (or reduction in treated water production capacity) in relationship to "normal" demand. Because average water use varies on a monthly, seasonal, and sometimes annual basis, the City will determine the actual water shortage stage based on the expected water production "gap" between actual available water supply and anticipated water use (water demand) at any given time. Reduction of available water supply by the indicated percentages will trigger an appropriate water shortage stage and the City will implement some or all of the response actions identified in Tables 6-1 through 6-6.

6.4 Shortage Response Actions

The WSCP is required to identify locally appropriate shortage response actions that align with the defined shortage stages and include demand reduction actions, supply augmentation actions, system operational changes, and mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions. For each response action the WSCP is to provide an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

6.4.1 Stages of Shortage Response Actions

The City has identified shortage response actions to be implemented during each of the six sequential stages and corresponding water shortage conditions. These actions are based on specific hydrological and regulatory conditions and the fundamental need to meet water service requirements within the City's service area. Moreover, the shortage response actions provide the City with some flexibility to address dynamic water shortage conditions while protecting the City against extreme conditions where supplies are drastically reduced beyond 50%. The following is an overview of the staged response actions the City could follow during a given water shortage condition based on shortage severity, relative supply conditions for each stage, and percent shortage reduction levels.

A water shortage declaration would be made by resolution of the City Council, with administrative discretion delegated to the Public Works Director under the direction of the City Manager (Mun. Code Sec. 6-6.19 (a) Emergency water restrictions and Sec. 6-6.04. Administration).

In general, shortage response actions are intended to address water shortages in City water production from the Water Treatment Plant, which is primarily treated surface water from the Feather River. . Because many of the City's parks are irrigated with groundwater and some property owners have wells

for irrigation, these properties may not be subject to the mandatory watering restrictions, with administrative discretion delegated to the Public Works Director restrict City groundwater use at Stage 3 and above or in response to catastrophic events.

The shortage response actions that may be implemented in each stage include, but are not limited to, the following:

Stage 1 (up to 10 percent shortage) "Water Alert" – If water supplies are threatened with constraint, the Plan calls for an introductory Stage 1 drought response, during which customers are informed of possible shortages and asked to voluntarily conserve 10 percent. In addition, customers are prohibited from wasting water or unreasonably using water for beneficial purposes. For example, prohibited water uses under this stage include: allowing water to run off unused into a gutter, ditch, or drain; failing to repair a controllable leak; washing sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas; utilizing a hand-held hose without an automatic shut-off nozzle; and irrigating during a precipitation event. Additional prohibitions will apply to new developments such as prohibiting single pass-through cooling water systems; commercial car washes and laundries without recirculating water systems; and decorative fountains without recirculating water systems.

This stage includes performing public outreach and education about the shortage and methods individuals can implement to reduce their water use. The City will inform the public and neighboring governmental bodies of the potential shortage condition and will coordinate with customers to implement the actions consistent with this Stage.

Stage 2 (up to 20 percent shortage) "Water Warning" – In the event Stage 2 is implemented the City will continue to encourage community-oriented voluntary conservation measures, enforce conservation measures, and implement mandatory water use reduction measures to decrease demand by up to 20 percent. Stage 2 activities include a continuation of activities described under Stage 1, as well as greater conservation and water use restrictions. These additional restrictions include beyond those identified in Stage 1, Encourage customers to voluntarily water one day less per week and to water during the coolest part of the day and vehicle washing must be done using a bucket or hand-held hose with an automatic shut-off nozzle, or take place at a commercial car wash. The City may consider limiting hours or closing spray pads or water slide at City parks. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage potentially subject to financial penalties as described in Subsection 6.8, below.

The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 20% reduction in use.

Stage 3 (up to 30 percent shortage) "Severe Shortage" – Stage 3 includes all response actions taken in Stages 1 and 2 and is focused on continuing to encourage customers to voluntarily reduce water use regarding turf watering, fillings pools, etc., and may include additional mandatory-watering restrictions as appropriate, such as allowing outdoor irrigation only between the hours of 6:00 PM and 9:00 AM on certain days. Increased monitoring related to prescribed water conservation actions will occur under this stage. The City would close spray pads and water slide at City parks Customer baseline water use

may be monitored and addressed with excess use above the shortage percentage potentially subject to financial penalties as descried in Subsection 6.8, below.

The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 30% reduction in use.

Stage 4 (up to 40 percent shortage) "Critical Shortage" – Stage 4 includes all response actions taken in prior stages regarding mandatory conservation and intensifies their implementation and enforcement. Stage 4 restrictions will be implemented if the Stage 3 demand reduction and other response actions are deemed insufficient to achieve reductions due to water supply shortages. All Stage 3 response actions will be intensified, and water production will be monitored daily by Yuba City for compliance with necessary reductions. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage potentially subject to financial penalties as descried in Subsection 6.8, below.

The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 40% reduction in use.

Stage 5 (up to 50 percent shortage) "Water Crisis" – Stage 5 includes all response actions taken in prior stages regarding mandatory conservation. The primary focus of Stage 5 is to ensure the protection of the water supply for all public health and safety purposes. This Stage will require reductions in water demand by up to 50 percent and will follow all voluntary and mandatory actions described in Stages 1-4. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage potentially subject to financial penalties as descried in Subsection 6.8, below. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 50% reduction in use.

Stage 6 (greater than 50 percent shortage) "Water Emergency" – Stage 6 includes all response actions taken in prior stages focused on reducing water demands by more than a fifty percent in response to greater than 50 percent water shortages. This stage requires only use of water for human health and safety purposes. No additional water uses are permitted, including any outdoor irrigation for anything other than maintenance of mature trees (particularly heritage oaks and cottonwoods). Customer baseline water use may be monitored and addressed with excess use above the shortage percentage potentially subject to financial penalties as descried in Subsection 6.8, below. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve greater than 50% reduction in use.

Shortage Response Actions

Tables 6-1 through 6-6 summarize staged response actions to reduce customer use and identify their estimated effectiveness (in parenthesis).

Table 6-1: WSCP Actions to Reduce Customer Use - Stage 1

Water Alert: Shortage up to 10%
1. Waste and Unreasonable Use of Water Prohibited and Voluntary conservation encouraged (up to 10%) 2. Situation and possible subsequent water shortage stages explained to the public and governmental bodies (up to 10%) 3. Focus on customers with high per capita water usage to achieve proportionally greater reduction than those with low use 4. Actions include, but not limited to: • Public information campaign consisting of distribution of literature, speaking engagements, website updates, bill inserts, and conversation messages printed in local newspapers • Educational programs in area schools • Conservation Hotline (combined up to 10%) 5. Consumption Reduction Methods, including: • Demand reduction program • Plumbing and irrigation fixture replacement • Water conservation kits • Education programs • Voluntary rationing (combined up to 10%) 6. Conservation Rules and Restrictions and Prohibitions on End Uses, to include: • Allowing water to run off unused into a gutter, ditch, or drain; • Failing to repair a controllable leak; • Washing sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas; • Utilizing a hand-held hose without an automatic shut-off nozzle; and • Irrigating during a precipitation event • For new development additional prohibitions include single pass-through cooling water systems; commercial car washes and laundries without recirculating water systems; and decorative fountains without recirculating water systems.

Table 6-2: WSCP Actions to Reduce Customer Use - Stage 2

Moderate Shortage (up to 20%)
• All measures implemented in Stage 1 • Request voluntary conservation water usage reductions (up to 20%) • Enforce Conservation Rules and Restrictions and Prohibitions on End Uses listed in Table 6-1 (10-20%) • Usage in excess of customer baseline may be subject to drought penalty • All Consumption Reduction Methods from Stage I and intensified as needed; additionally: • Use prohibitions • Encourage customers to voluntarily water one day less per week and to water during the coolest part of the day • Vehicle washing must be done using a bucket or hand-held hose with an automatic shut-off nozzle, or take place at a commercial car wash. • Limit hours or close spray pads and water slide at City parks.

Table 6-3: WSCP Actions to Reduce Customer Use - Stage 3

Severe Shortage (up to 30%)
1. All measures implemented in Stages 1 and 2 2. Enforce outdoor irrigation restrictions including limiting number of watering days per week, and time when irrigation can occur (e.g., between 6:00 pm and 9:00 am) 3. Some or all of the following: • Adherence to customer baselines and actual water use reductions water allocations and mandatory conservation rules • Water usage goals established by an authorized government agency or official • Customer water usage in excess of baseline to be monitored and recorded • Intensify enforcement of water use prohibitions; including restrictions of days and daytime hours for watering, excessive watering resulting in gutter flooding, using a hose without a positive shutoff device, use of decorative fountains with non-recirculating pumps, washing down sidewalks or patios, not repairing leaks in a timely manner, etc. (up to 30%) 4. Monitor water production weekly for compliance with necessary reductions; 5. All activities are intensified and production is monitored daily for compliance with necessary reductions. (up to 30%) 6. All Consumption Reduction Methods from Stage 2 and intensified as needed; additionally: • Reduce pressure in water lines; Flow restriction • Mandatory rationing • Close spray pads and water slide at City parks • Incentives to reduce water consumption; Excess use penalty • Percentage reduction by customer type (combined up to 30%) 7. Penalties and Charges for Excessive Use, including penalties for not reducing consumption, charges for excess use

Table 6-4: WSCP Actions to Reduce Customer Use - Stage 4

Critical Shortage (up to 40%)
1. All measures implemented in Stages 1-3 2. All activities are intensified and production is monitored daily for compliance with necessary reductions. (up to 40%) 3. All Consumption Reduction Methods from Stage 3 and intensified as needed; additionally: • Restrict building permits; Restrict for only priority uses 4. Penalties and Charges for Excessive Use, including penalties for not reducing consumption, charges for excess use (up to 40%) • Continue monitoring and addressing water use above baseline with penalties 5. Catastrophic Event (Supply reduction up to 40%): Implement Applicable Actions for Catastrophic Events

Table 6-5: WSCP Actions to Reduce Customer Use - Stage 5

Shortage Crisis (up to 50%)
1. All measures implemented in Stages 1-4 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes (up to 50%) 3. All activities are intensified and production is monitored daily for compliance with necessary reductions (up to 50%) 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Possible reductions in customer baselines and actual water use reductions (up to 50%) 6. Usage in excess of customer baseline to be charged at regular rate plus an additional drought emergency surcharge amount (up to 50%) Update current water shortage condition response measures based on Council approvals and direction, state policy directives, emergency conditions, or to improve customer response 7. Catastrophic Event (Supply reduction up to 50%): Implement Applicable Actions for Catastrophic Events (such as boil water order) - Continue water monitoring for reduction from baseline with potential penalties

Table 6-6: WSCP Actions to Reduce Customer Use - Stage 6

Emergency Shortage (greater than 50%)
1. All measures implemented in Stages 1-5 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes (>50%) 3. All activities are intensified and production is monitored continually for compliance with necessary reductions (up to >50%) 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Possible reductions in customer baselines and actual water use reductions (up to >50%) 6. Usage in excess of customer baseline to be charged at regular rate plus an additional drought emergency surcharge amount 7. Update current water shortage condition response measures based on Council approvals and direction, state policy directives, emergency conditions, or to improve customer response 8. Catastrophic Event (Supply reduction greater than 50%): Implement Applicable Actions for Catastrophic Events. Continue water monitoring for reduction from baseline with potential penalties

6.4.2 Demand Reduction Actions

The City has identified a range of available and feasible customer demand reduction actions that can be used adaptively and implemented with progressively greater intensity to meet the supply shortage challenges faced under each water shortage condition. These demand reduction actions are identified by the associated water shortage stage in which they may be implemented. Tables 6-1 through 6-6 summarize Yuba City demand reduction actions associated with each water shortage stage and shortage level. An estimate of the action's effectiveness as related to that stage is indicated parenthetically. Other response actions not specified in this Plan may also be identified by the City to implement the essential purposes of this Plan or the UWMP (see CWC 10632.2).

6.4.3 Supply Augmentation Actions

The flexible management of the City's water supplies to avoid shortages and support water system reliability have been described in Chapter 3. The following supply augmentation mechanisms may be used as response actions under a given water shortage condition, in combination or as replacement to demand reduction responses, as determined by the City.

Emergency Intertie with Marysville Treated Water System - The City completed construction of an emergency intertie with California Water Service Company (Cal Water), which serves the City of Marysville, in 2020. This intertie has a capacity of 1,500 gallons per minute (gpm). It crosses the Feather River as part of the newly completed 5th Street Bridge replacement project, connecting the water distribution systems of the two cities and providing for emergency service in either direction on demand. The emergency intertie is available as needed to mitigate the water shortages under all stages. An agreement for usage of the intertie is currently being developed by the City of Yuba City and Cal Water.

Emergency Groundwater Supply - One groundwater well is located at the WTP and connected with the water supply system by providing a raw water source into the WTP, providing immediate supplemental water supply of up to 1,500 gpm. This well is regularly maintained and managed to enhance the City's water reliability. The WTP groundwater well is available as needed to mitigate the water shortages under all stages.

The City also owns several legacy groundwater supply wells in various locations, many of which are adjacent to the water distribution pipelines (see Figure 2-7). Several of these wells (5,8,9 arsenic treatment plant) are being rehabilitated as emergency supply wells and are currently scheduled to be in production and available to provide emergency groundwater supplies. Within a few days the cumulative potential production capacity of these wells would be 2,300 gpm. The City will assure any direct use of groundwater conforms with drinking water standards, which may require well-head treatment. In addition, future groundwater use may be restricted by groundwater management provisions associated with implementing the Sutter Subbasin Groundwater Sustainability Plan. The City is one of nine Groundwater Sustainability Agencies which work collaboratively as the Sutter Subbasin Groundwater Management Coordination Committee (SSGMCC) to ensure the long-term supply and quality of groundwater resources in the basin.

Aquifer Storage Recovery (ASR) – The City has evaluated the feasibility of an aquifer storage recovery (ASR) project to enhance water supply reliability. The ASR system would allow the City to divert and treat seasonally available surface water for long-term underground storage, thereby creating a significant emergency storage capability.

6.4.4 Operational Changes

The following water system operational change may be used as response actions under a given water shortage condition, as determined by the City.

Reduce Water System Pressure – The City normally operates its water distribution system at 50 to 60 pounds per square inch (psi). In the event of significant water shortages, the system pressure could be reduced to a minimum pressure of 50 psi to maintain sufficient fire flow. System pressure is maintained using variable speed pumps. No elevated water storage tanks are in use. The pressure reduction would reduce demand and reduce the amount of distribution system leakage. Reducing water system pressure is included as a response action under Stage 3 no lower than 50 psi to ensure adequate pressure to meet fire flow requirements.

6.4.5 Mandatory Prohibitions

This section is required to identify any mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions. The Yuba City Water Regulations prohibit water waste. Certain prohibited water use practices, including intentional or unintentional water waste and unreasonable uses of water, are also listed among the demand reduction actions on Tables 6-1 through 6-6.

6.4.6 Emergency Operations Plan for Catastrophic Water Shortages

This section identifies actions to be undertaken by Yuba City to prepare for, and implement during, a catastrophic interruption of water supplies. In addition to climate, other events that can cause water supply shortages are earthquakes, chemical spills, flooding, dam failures, waterline ruptures, and energy outages at treatment and pumping facilities, which could cause a water shortage severe enough to trigger a Stage 1-6 water supply shortage condition.

The City Manager's Office and the Fire Department are planning to begin development of an Emergency Operations Plan soon, which will provide procedures and guidance to City personnel in responding to emergency situations including catastrophic events, both natural and manmade. The plan will provide procedures for preparing, mobilizing, and employing City resources and coordinating outside resources during an emergency. The City provides periodic training, including simulated events and responses to keep City personnel fully trained on implementation of emergency procedures. Mobilization is consistent with Standardized Emergency Management and the Incident Command System.

In addition to specific actions to be undertaken during a catastrophic event, the City performs maintenance activities, such as annual inspections for earthquake safety, and budgets for emergency items, such as auxiliary generators, to prepare for potential events.

The following is a summary of actions cross-referenced against specific catastrophes for three of the most common possible catastrophic events: regional power outage (such as Public Safety Power Shutoff or "PSPS" events), natural disasters (such as earthquake, flood or storm damage, or fire), and malevolent acts.

Table 6-7: Response Actions during Catastrophic Events

Possible Catastrophe	Summary of Potential Actions
Regional Power Outage	• Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Establish water distribution points and ration water if necessary. • If water service is restricted, attempt to provide potable water tankers or bottled water to the area. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination. • Utilize backup power supply to operate pumps in conjunction with elevated storage.
Natural Disaster	• Assess the condition of the water supply system. • Complete the damage assessment checklist for reservoirs, water treatment plants, system transmission and distribution. • Coordinate with Governor's Office of Emergency Services. City to identify immediate firefighting needs. • Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Prepare report of findings, report assessed damages, advise as to materials of immediate need, and identify priorities including hospitals, schools and other emergency operation centers. • Take actions to preserve storage. • Determine any health hazard of the water supply and issue any "Boil Water Order" or "Unsafe Water Alert" notification to customers. • Cancel the order or alert information after completing comprehensive water quality testing. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination.
Malevolent acts	• Assess threat or actual intentional contamination of the water system. • Notify local law enforcement to investigate the validity of the threat. • Get notification from public health officials if potential water contamination. • Determine any health hazard of the water supply and issue any "Boil Water Order" or "Unsafe Water Alert" notification to the customers, if necessary. • Assess any structural damage from an intentional act. • Isolate areas that will take the longest to repair and or present a public health threat. • Arrange to provide emergency water.

6.4.7 Seismic Risk Assessment and Mitigation Plan

Beginning January 2020, CWC Section 10632.5 mandates urban water suppliers include in their UWMP a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. This requirement can be met by submittal of a copy of the most recent adopted local hazard mitigation plan or multi-hazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multi-hazard mitigation plan addresses seismic risk.

Sutter County is currently partnering with the Cities of Yuba City and Live Oak and several special districts to develop a Local Hazard Mitigation Plan (LHMP) Update to the 2013 LHMP. The LHMP Update assesses current community risk and vulnerability to identified hazards (including seismic risk), identifies implementation actions to reduce future losses, and serves as a means to maintain eligibility for federal mitigation funds in accordance with the Disaster Mitigation Act of 2000.

Yuba City intends to submit a copy of the final Sutter County LHMP 2021 to DWR. The LHMP concludes that Sutter County has a low to moderate risk of earthquake occurrence and medium vulnerability. Earthquake hazard for Yuba City is characterized with regard to the likelihood of occurrence as "Unlikely", and with regard to vulnerability as "Medium"; seismic shaking maps show Yuba City in a low to moderate shake risk zone (Annex B, Draft LHMP 2021). The LHMP includes a number of Multi-Hazard Actions for Yuba City which will serve to mitigate the risk posed by the identified hazards, including seismic risk.

6.5 Communication Protocols

The City maintains an established and effective communications program to inform its customers, neighbors, and other stakeholders of water service issues, updates, and policies. Implementation of the WSCP will utilize the existing communication program structure to inform customers and others of the declared shortage stage and respective actions and restrictions in place.

The City Council meetings addressing the Annual Assessment and any potential water shortage declaration will be noticed using normal City Council meeting public notification procedures. The meeting will also be announced through regular agenda posting protocols.

Once a shortage stage as been declared by the City Council, the City will notify its customers and others through a range of efforts. The stage and restrictions will be identified in a press release, customer billing statements, and posted on the City's website. Specifically, the City's website will be updated to feature the shortage declaration, restrictions, and resources available to customers from the City and other entities to help meet the restrictions. Subsequent City Council meetings will include a review of the shortage condition, customer response results, and discussion and recommendations for potential modifications. The City will also coordinate with water providers in Sutter County, Cal Water and the City of Marysville, and other public agencies such as Sutter County's Office of Emergency Services as necessary, to declare a local emergency with respect to anticipated water supplies and demands in the event conditions necessitate.

The City's communications protocols may include, but are not limited to, some or all of the following locally relevant actions. These communications protocols will be used at the discretion of City staff based on then-current and anticipated water shortage conditions:

- Publishing information on Yuba City's website.
- Staffing a telephone hotline.
- Providing bill inserts and direct mailings above and beyond those legally required.
- Directly calling customers.
- Distributing materials for non-English speaking customers.
- Preparing social media posts to communicate Yuba City actions.
- Advertising actions on other local audio and video media.
- Coordinating voluntary and mandatory water conservation activities with other local and regional governing bodies.
- Using CodeRed, the City's emergency alert system.

6.6 Compliance and Enforcement

The Yuba City Water Regulations (Chapter 6 of Title 6 of the Yuba City Municipal Code) include the legal authority for the City Council impose emergency water restrictions and specifies significant compliance and enforcement options.[61] Compliance is generally improved by on-going customer outreach and education. City staff has discretion to enforce the Yuba City Water Regulations using warnings and by issuing citations to water customers in consideration of the specific circumstances, including the applicable water shortage stage. Violations may include watering on the wrong day of the week or midday, watering on the correct day of the week but wasting water into the street, using water to clean sidewalks, driveways, parking lots and other hardscapes, and failing to use shutoff nozzles on hoses. Financial penalties, flow restrictors, and disconnected water service are among the options available to the City to ensure compliance with the required water shortage actions. Appeals processes are also available for those that are subject to the enforcement.

Enforcement measures include, among others:

- Water patrol staff looking for properties in violation of the emergency water restrictions.
- Water patrol staff obtains time-stamped photos of the property as the violation is occurring.
- The photo is attached to a letter that is sent to the person to whom the water bill is sent notifying them of the violation and giving them one week to make the necessary adjustments to gain compliance.
- If a second or subsequent violation is issued, the Finance Department may add the appropriate surcharge to their next monthly bill.

The penalties associated with water use violations are assessed in the form of a surcharge added to the bill of the responsible party. Section 6-6.20 of the City Municipal Code states:

[61] https://library.municode.com/ca/yuba_city/codes/code_of_ordinances?nodeId=TIT6PUWO_CH6WASY

"For each violation of any of the provisions/regulations set forth in this chapter, there shall be assessed against the responsible party for the property on which the violation occurs, i.e. the owner, lessee, person in possession of said property, or the person reflected in the Yuba City utility records as the party to whom the water bill is sent, the following penalties:

a) First violation: A written warning of such violation

b) Second violation: Fifty and no/100ths ($50.00) Dollars surcharge which shall appear on the next monthly water billing.

c) Third violation: One hundred and no/100ths ($100.00) Dollars surcharge which shall appear on the next monthly water billing.

d) Fourth and subsequent violations: Two hundred- fifty and no/100ths ($250.00) Dollars surcharge which shall appear on the next monthly water billing."

6.7 Legal Authorities

The City is authorized to implement and enforce the water shortage response actions in this WSCP by Chapter 6 of the Yuba City Municipal Code, the "Yuba City Water Regulations." This includes the legal authority for the City Council impose emergency water restrictions and specifies that "the regulations in the WSCP will apply"[62], including the water shortage response actions required to meet the specific circumstances posed by the water shortage stages described in Subsection 6.3, above.

In addition, the City is able to exercise general powers granted to water distributors in CWC §§350-359. CWC §350 authorizes the governing body of a distributor of a public water supply to declare a water shortage emergency whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent there would be insufficient water for human consumption, sanitation, and fire protection. Upon a finding of such an emergency condition, the distributor can adopt such regulations and restrictions on the delivery and consumption of water as will conserve the water supply for the greatest public benefit, with particular regard to domestic use, sanitation, and fire protection (CWC §353). The regulations and restrictions remain in force and effect until the supply of water available for distribution within such area has been replenished or augmented, and restrictions may include the right to deny new service connections and discontinue service for willful violations (CWC §355 and §356). The City also coordinates with Sutter County and the City of Marysville for the possible proclamation of a "local emergency" under California Government Code, California Emergency Services Act (Article 2, Section 8558).

[62] Yuba City Municipal Code, Chapter 6 – Water System

6.8 Financial Consequences

The Act requires an analysis of the impacts of implementation of this WSCP and likely financial consequences to the City. This section addresses aspects of revenue reduction, expense increases, and additional costs that may arise, and identifies financial response actions.

6.8.1 Revenue and Expenditure Impacts

The City water utility is a financially independent enterprise. The City has established water rates that support its on-going operation and maintenance activities, as well as the capital projects required to provide a safe and reliable water supply to its customers. Metered customers are billed per unit of water used under the City's rate structure, with a minimum monthly fee determined by the meter size. Because water rates are tied to customers' normal water consumption activities, if there were a significant reduction in demand due to customer conservation measures associated with a water shortage condition, the City water utility will experience a reduction of income. In addition to the revenue reductions, the City will also experience an increase in expenses resulting from augmented communication actions, increased enforcement activities, and the administration of water shortage management actions identified in the WSCP. At the same time, a decrease in expenses related to power costs, raw water costs, and chemicals to treat the water would also occur. Staff will regularly report the identified and anticipated revenue and expenditure impacts and recommend appropriate responses to the City Council.

The City water utility can absorb a reduction of income without an immediate required rate adjustment. The City maintains a minimum of three months operating reserves and at least 3.5 million dollars in reserves that can be used as an emergency fund for water in the event of water shortages. However, if the water utility experienced a significant water shortage and reduced water demand over the longer-term, the rate structure would be reevaluated and adjusted as required.

6.8.2 Drought Rate Structures and Surcharges

The City does not currently have a drought rate structure or surcharges. As water rate structures are subject to the regular rate review, the City may choose to consider adopting drought rate structures or surcharges to address the financial consequences of longer-term water shortages. Should the City decide to proceed, such rate changes would be adopted in compliance with statutory rate-setting requirements. Once in place, the drought rate structure or surcharge could be activated by resolution of the City Council and remain in effect until water shortage end and drought-related costs have been recovered.

6.9 Monitoring and Reporting

The City will conduct regular monitoring and reporting to ensure WSCP implementation is effective and responsive to conditions as they unfold. The City will then use this information to restore and maintain the water supply and demand balance. Similar to the supply and demand projections used to establish a shortage condition, the City will monitor the same data to determine effectiveness and efficacy.

Monitoring activity will include, but is not limited to:

- Gathering monthly or bi-weekly customer water use data.
- Preparing technical assessments of customer water use and identifying deficiencies.
- Analyzing trends in water supply availability, including meteorological events, regional water supply coordination actions, and statewide regulatory trends.
- Assessing water conservation activities and the effectiveness of enforcement actions as applicable to achieving conservation objectives.

Data reporting will include preparation of written reports and presentations, as necessary, for Yuba City management meetings and other public meetings summarizing key information and data, including but not limited to:

- Actual water demands compared to projected demands by customer class and in total.
- Actual supply availability and utilization compared to projected availability for each supply source.
- Projected supply availability for next 12 months for each supply source.
- Monthly reporting of water production and conservation, as required by the State Water Resources Control Board.

These and other data will be regularly evaluated by staff to assess the effectiveness of response measures and to identify the need for any changes or modifications to the declared water shortage stage or actions based on the results. City staff will report to the City Council on a bi-monthly basis as needed to report the status of the water utility. With regard to monitoring and reporting, City staff may determine the need for additional monitoring and reporting measures, or the need to develop or amend ordinances, or update the WSCP as a whole. Any WSCP update or modification will be conducted through the City Council public meeting process, unless specific conditions require otherwise.

6.10 Re-evaluation and Improvement Procedures

The City will continually review and assess its procedures for implementing the WSCP. Specifically, the City will use the monitoring and reporting protocols identified above as a quality assurance and quality control measure to understand the effectiveness of water conservation activities. These re-evaluation and improvement procedures will include developing reports, memoranda, and presentations that assess the effectiveness of water conservation actions and the WSCP. These materials will be provided to the City's customers and decision-makers for consideration. Public comments on the published materials and management considerations should be incorporated into the development and implementation of future actions. These protocols will be continually assessed and updated by the City management staff.

6.11 Special Water Feature Distinction

For purposes of water shortage contingency planning and implementation, the City defines as "special water features" those that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains. Such special water features are considered distinct from swimming pools and spas (as defined in subdivision (a) of Section 115921 of the Health and Safety Code).

The City has determined that special water features are a relatively small discretionary use but may be restricted under all identified water shortage conditions. Water shortage response actions will focus on health and safety issues and balancing continuation of these uses with the severity of the water shortage condition. The relative total water use from these sources is a consideration for how special water features and swimming pool uses could be curtailed during specific water shortage conditions. For instance, when swimming pool filling and refilling would exceed a customer's use allocation under the various drought stages, then these actions are prohibited and can be subject to City enforcement actions.

6.12 Plan Adoption, Submittal, and Availability

The WSCP has been adopted, submitted, and is available as required by the Urban Water Management Planning Act. As a stand-alone document, the WSCP is also subject to the following separate adoption, submittal, and availability processes, and whenever it is separately amended or revised in the future. Yuba City may refine or amend this WSCP as necessary and in compliance with the normal public notice and adoption. Yuba City has followed all applicable law in adopting the WSCPs. The current adopted WSCP shall be available to City customers and to Sutter County and the City of Marysville within 30 days of its adoption. A copy of the current WSCP is available for public inspection during business hours at City Hall, located at 1201 Civic Center Blvd, Yuba City (subject to current COVID-19 restrictions). The current WSCP is posted and available for download here: https://www.yubacity.net/city_hall/departments/public_works/utilities/water/water_treatment/water_planning/urban_water_management_plan.